

CAPCOM 133100 and the attitude is good except  
PITCH is 105.

CASPER Okay, I copy. Noun 33 096133100, the  
attitude 000105 and 000.

CAPCOM Good readback, Ken. And in regard to  
that question you had about 16-3, your present ground track  
is about 15 000 feet south of the preplanned and that puts  
16.1 outside the acceptable limits. 16-3 is closer to  
the landing site and they would like you to go ahead and  
use that.

CASPER Will do.

CAPCOM And I guess the message is, Ken, just  
shoot the center.

CASPER Alright, I'll do that.

CASPER Okay, I don't have it off yet, John.  
What happened to our hot fire?

CASPER Okay, you want B3 off now.

CASPER B3 is OFF.

CASPER Okay, tell me when you want the 620.

CASPER Okay, that's plus 2.68 plus 109.19 plus  
5.03.

CAPCOM Casper, Houston. We're about 2 minutes  
from LOS.

CASPER Orion, say again, please.

CAPCOM Roger. This is Houston, Casper. We're  
about 2 minutes from LOS.

CASPER Okay, Houston. Stand by. Break.  
Orion, IMMY deadband at hold. Okay, I'll go free when you  
give me the call. Break. Houston, this is Casper. Go  
ahead.

CAPCOM Roger, Ken. We've got about a minute  
till LOS. I was just telling you.

CASPER Hi gang.

END OF TAPE

CAPCOM Orion, this is Houston. Will you select down voice backup.

CAPCOM Roger, we're reading, but there's still excessive noise down here.

CAPCOM I think it's about the same, Charlie.

CAPCOM Casper, Houston, how do you read?

CASPER Loud and clear. Let me clean up somethings, Hank, and I'll be with you in just a minute.

CAPCOM Okay.

CASPER Go ahead, Orion.

CASPER Okay, on your right side. Okay, I got it, and it's moving in, it looks like a combination now. It's moving though, it's oscillating at this time. Now it's steady.

CAPCOM Ken, your T2 time is good.

CASPER Okay, Hank. I'm trying to get things all straighten up.

CAPCOM Orion, this is Houston with another procedure for the S-band.

ORION (Garbled and heavy background noise.)

ORION Roger.

CAPCOM Roger, we want you to open the S-band antenna circuit breaker on panel 11, wait 1 minute and then try acquisition again.

ORION Roger -

CAPCOM After that 1 minute you can close the circuit breaker and try an acquisition.

ORION Rog.

ORION That's for state vector, okay.

ORION We'll get VERB 74.

ORION VERB 71.

ORION VERB 71 enter.

ORION Enter.

ORION 24 enter.

ORION 24 enter.

ORION It doesn't say that.

ORION Okay, Houston. How do you, you load this state vector by a VERB 71 and then a 24 enter and then enter the numbers, right.

ORION No that's the REFSMATT.

CAPCOM Stand by.

ORION State vector's the 240 cut. See we've got a flashing 21. I guess you do a 24 and you going to get it. The VERB 71 and then you've got 24 index -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 12:20CST 96:26GET CM3/1

CASPER Okay, did you read?  
CAPCOM Casper, did you call?  
CASPER Houston, can you read Casper?  
CAPCOM Hello Casper this is Houston. I'm reading  
you - there is a little bit of noise in the background, Ken,  
but I'm reading you okay.  
CASPER Okay, I understand that my P2 time is good.  
CAPCOM That is affirmative.  
CASPER Okay, it looks like my maneuver is going to  
get me there about right now.  
CAPCOM Just as predicted, huh?  
CASPER It pays to proceed different.  
CAPCOM That's pretty neat.

END OF TAPE

CAPCOM Orion this is Houston. Roger. You should enter it just as it is fed up on the PAD.

CASPER Understand, VERB 71 and then a 24 enter than a 01731 enter and so on.

CAPCOM That should be correct.

CASPER 017313 enter. Okay. 12560 enter 22624 enter. 66315 enter. 75546 enter. 75546 enter. 71001 enter. 47526 enter. 02044 enter. 04020 enter.

CAPCOM Just as predicted, hu?

CASPER Nice machine.

CAPCOM That's pretty neat.

CAPCOM Casper R3 should be minus 00014.

CASPER (garble) Yeah, I got out of here ROLL 15, PITCH to 96000. Am I not correct?

CAPCOM Roger. I was looking at your NOUN 89 there and comparing it with the value in the PAD there.

CASPER Oh. Thank you very much. Thank you. You've got good eyes.

CASPER It's surprising I get a great big charge just looing through the telescope and I can't spend much time over here with the naked eye and the telescope.

CAPCOM Roger.

CASPER The things I'm looking at now are really not that far from the (garble).

CAPCOM Casper you're coming up on 10 seconds to C1.

CASPER Thank you sir.

CASPER The (garble) back is running.

CAPCOM Roger, coming up on B2.

CASPER Okay.

CAPCOM Told you wrong on that Kenneth. A little while ago (garble).

CAPCOM Okay Casper you're coming up on P2 now in about 10 seconds.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 12:39CST 96:45GET CM5/1

CAPCOM Okay, Casper you're coming up on P2 now  
in about 10 seconds.

CAPCOM Go ahead, Casper, are you ready for a  
rendezvous radar VHF range check?

CAPCOM Casper, Houston. If you'll give us accept  
we'll uplink your state vector target load.

CASPER Okay, you've got it.

CAPCOM Casper, Houston we'd like to go on and get  
the GARBLE pad up to you.

CASPER Give me about 30 seconds, Hank and I'll  
give you a call.

CAPCOM Wilco.

CASPER Okay, Hank I'm ready.

CAPCOM Roger, GARBLE SPS G&N 39 293 plus 049 plus  
122 097 40 17 16 plus 00 681 minus all zips, minus 00580 000  
142 358. NOUN 44 00 674 plus 00516 00 895 005 00780. The rest  
of the pad is NA set star, Sirius, Rigel 131 071 014, 2 jets  
16 seconds quads BRAVO and DELTA in the pad and the computer  
is yours.

CASPER Okay, thank you very much, Hank. I'll read  
it back to you in just a second. Okay, Ed, SPS G&N 39 293  
plus 049 plus 122 097 40 17 16 plus 00 681 all zips, minus  
00580 000 142 358. 00 674 plus 00516 00895 005 00780, Sirius  
and Rigel 131 071 014, 2 jets -

END OF TAPE

CM Under 3 plus 049 plus 122 097 40  
1716 plus 00681. All zips minus 00 580 000 142 358 00 674  
plus 00 516 00895 005 00780. Series and (garble) 131 071014  
2 jet 16 seconds quad BRAVO and Delta, over.

CAPCOM Is that readback, Ken and I'll give  
you the (garble) pads after you do your P52.

CM Okay, Yeah, let's get to work on these  
first. Thank you.

CM Hank, it looks like we made a little  
descrepancy here in the way it is now. It shows we crossed out  
the VERB 48 at 97:15 to get us on 10101 because they are al-  
ready there, I thought, and it doesn't look like the case --  
I have difficulty catching it up here after the burn  
It is probably okay in its present form, is that correct?

CAPCOM That's affirmative. We went to 10102  
back at 96:34 and we crossed out the one at 97:15 and we figure  
that same depth and it would hold you through the burn and  
we'll go to the new DAC after the burn.

CM Okay. Thank you.

CAPCOM The reason is being, is because we do  
have 509 in there. We can't do another DAC with it running.

CM Roger, understand it. Thank you, sir.

CM Just want to make sure with all the changes  
around in this 509 that we hadn't overlooked one.

CAPCOM Roger.

CM Houston, what do you say we pass the GEC  
aline for the COAS calibration maneuvering get back on  
the time line?

CAPCOM Standby one.

CAPCOM That's a good plan, Ken. We concurr.

CM Okay, thank you.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 12:59 GET 97:05 CM-7/1

CAPCOM Casper, while your maneuvering there would you want to copy the abort path?

CASPER All set.

CAPCOM Okay, echo 098 47 all zips. Foxtrot plus 01023 all zips minus 00500 Golf 09935 all zips, Hotel 101221500, India 098350468, Juliet 101221500, Kilo 10321 all zips, Lima 098592903, Mike 105194500, November 100424286, end of pad.

CASPER That was a super (garble), Hank. I'll read back, Echo 09847000 plus 01023 all zips, minus 00500, Golf 09935 all zips, Hotel 101221500, Indian 098350468 101221500, Kilo 10321 all zips, Lima 098592903 105194500 100424286. Over.

CAPCOM Good readback, Ken.

CAPCOM And Casper, for your information zips and mags look good.

CASPER Alrighty.

CASPER Orion, Casper.

CASPER Orion, Casper. Orion, Casper. Rog. I take it we've deleted the rendezvous radar check, is that good? I'm asking the question. Did we delete the --

END OF TAPE

APOLLO 16 COMMAND MODULE COMMENTARY CST 13:08 GET 97:13 CM-8/1

CAPCOM Casper, a preliminary look at your tracking data looks real good.

CASPER Okay, I hope it is.

CAPCOM Casper, Houston, we have a go for circ and a little reminder there don't forget to terminate the AMP after the burn.

CASPER Okay, the AMP will be terminated after the gimbal drive check. Is that affirm.

CAPCOM That's affirmative.

CASPER Alrighty, thank you.

CAPCOM Casper, Houston, we're about 2 minutes from LOS.

CASPER You're okay, Hank, thank you sir.

END OF TAPE

CAPCOM Casper, Houston. How do you read?

CASPER Okay, they're locking up on me. Hello, Houston. This is Casper bar now. We did not do circ, and I'd like to talk about the TDC serval loops.

CAPCOM Understand. No circ.

CASPER That's affirmative. Presently, about a mile ahead of the LM, and I'd like to talk about a PBC serval loop problem.

CAPCOM Okay, Ken. Go ahead.

CASPER Okay, and break in and tell me as soon as you get DS - get ready to dump the DSZZ to pick up the one we're talking about, and I'll leave the antenna on and make it a little wide till you do. Okay, the text is that we came up to the burn time and I was going through the gimbal checks, number 1 serval started normally, and checked out, I switched to clockwise on the THC's and performed on the secondary gimbal check and started them - they looked normal. I set the PITCH trim normally, and I went to set the YAW trim and I've just been checking that the trim clock work worked, and I got divergent oscillations on the YAW and TRIM indicator and you could feel them in the spacecraft so I switched to the serval power to the number 2 serval to AC 1, main A and tried that, that had no effect, and then I cycled through looking at the gimbal - with the AUTO drive switch in number 1 and number 2 in AUTO, and every time I selected number 2, by some means, I had the same results. And then I tried SCS in model and as soon as I would excite some motion in the secondary YAW serval why it would go unstable again. I then tried using the G&N to drive the gimbal and I did the first half of the gimbal drive in serval loop 1 and then switched to the serval 2 for the second half and then again the same instability showed up. Based on the rule of 4 serval loops, I cancelled the circ. I had no other indications in the cockpit, no warning lights, no other abnormalities.

CAPCOM Roger. We copy.

CASPER I wasn't back running, but I don't think that could have had any effect when SPS was going.

CAPCOM Roger. Could we get you to go to the ARS attitude, Ken, so we can dump the data?

CASPER Yes, sir, will do.

CASPER How about if I just give you the high gains from right here?

CAPCOM Okay, if you think you can get it up.

CASPER Okay, I've got you a solid lock on the high gain.

CAPCOM Casper, Houston. We'd like to verify that -

CAPCOM Casper, we'd like to verify that the oscillations were on serval loop number 2. Is that correct?  
CASPER That's affirmative, serval loop number 2 YAW only.  
CASPER Roger. And serval loop number 1 is okay?  
CASPER That's affirmative.  
CASPER And did I read that the first time through the serval checks, they were okay and then when you started to set the YAW trim, the oscillation started, and at once you had the malfunction it occurred -  
CASPER No, sir. The primary loop checked out normally, the secondary loop never checked out in YAW serval.  
CASPER Roger, copy. And that was first -  
CASPER Normally - go ahead, Hank.  
CASPER Roger, and that occurred both in SCS and G&N, is that correct?  
CASPER That's affirmative and I tried both 0 and recommand in SCS.  
CASPER And Ken, we'd like to confirm that was a divergent oscillation, is that correct?  
CASPER That's affirmative.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 14:13CST 98:19GET CM10/1

CAPCOM Casper, Houston, we'd like for you to run another gimbal drive check on the yaw axis on both SPS and G&N and let us take a look at it.

CASPER Okay, I'm prepared to do that right now if you're ready.

CAPCOM Ready to go.

CASPER Okay, I'm bringing the bus ties on. Okay and servo powers 1 and 2 are on and GARBLE configuration. Are you ready for me to start the gimbal?

CAPCOM That's affirmative, Ken, go ahead.

CASPER Okay, here comes - you just wanted to look at the yaw - here comes yaw number 2 - there it is and it's oscillating now and it's stamped out and that's in auto. I'll switch to number 2 and number 2 in AUTO. I'm now going to move the thumb wheels and well, now it's - there it goes - it's oscillating and it's divergent and I'm turning the gimbals off. Okay, yaw gimbal number 2 is off. I'll hold this configuration.

END OF TAPE

CASPER            Garble John, you want to try the VHF ranging while we're above it?

CASPER            Orion, Casper.

CASPER            Would you like to try to check out our VHF at the same time?

ORION             Okay.

CASPER            It sounds very garbled. If you can read me, Orion, you are extremely garbled, and making a pulsing noise sound.

CASPER            Orion, do you read me on B duplex?

CASPER            Orion, do you read, Casper?

CASPER            Houston, Casper.

CAPCOM            Casper, Houston, go ahead.

CASPER            Rog, it looks like I'm losing com with Orion, could you ask him to go back to A simplex?

CAPCOM            Will call.

ORION             Okay, you were just about unreadable. I don't know if you can pick me up on that other configuration, but that didn't work at all.

END OF TAPE

CASPER                    Okay, you were just about unreadable I don't know if you can pick me up on that other configuration, but that didn't work at all. Yes, but it was coming through completely garbeled unintelligeable. Okay - okay and if no joy in 30 seconds we'll come back to A simplex. Okay, now do you read me now. Your still very scratchy, hardly make you at at all. Yes, that's pretty bad. That's not much better, it's not near like what we got before. Let's go back to A simplex. Hey, you sounded good now.

CASPER                    Hey, Charlie. Okay, you want to turn your light on when it gets dark and how about lets try a little ranging here before we go into the darkness. Comm now your on configuration of ranging.

CAPCOM                    Hey, Jerry am I on your loop: Okay, on this conservation here, I ran this rendezvous from the mini ball.

CASPER                    Hey, Stewart your on air to ground.

CAPCOM                    Sorry about that, Ken.

CASPER                    Hey, Charlie let's - hey Charlie how about lets try out this ranging. Your in the ranging configuration, right? Okay, standby for my 30 seconds till I try to lock up.

CASPER                    Okay I've got you at .36 38 36 well there out, how does that compare? That doesn't really.

CASPER                    Yes, I think so might as well keep it on looks like we're getting ready to go in the dark here. Could you wait till we get in the dark so I can look at you right now I've got the sun right smack in my eyes.

CASPER                    Can you get any words out of Houston I haven't heard a word from them.

CAPCOM                    Casper, Houston. We're working on a problem down here.

CASPER                    Rog, Henry I understand that I'm not bugging you. We'll stay off the loop.

CAPCOM                    Okay, we've got the data down and we've got the strip charts and we're taking a look here and see if we can't find some way to get around it.

CAPCOM                    Okay, I know if there's a way you'll find it.

END OF TAPE

CASPER Standby a second.  
 CASPER Was doing temporary battle with our friend  
 the trash bag.  
 IRION I have you visual. Tally ho.  
 CASPER Okay, I'll keep you in sight.  
 ORION That old stroll is really nice.  
 CAPCOM Casper, Houston.  
 CASPER Go ahead, Houston.  
 CAPCOM Okay, we're getting set up for another  
 gimbal drive check and what we want to do is go through a complete gimbal drive check by the numbers and have you tell us - have you do each thing and especially in relation to the YAW thumb wheel, which way you are moving it and how many degrees and what's happening, and we'll give you the word when we are ready to start that. We've got to get some things configured down here.  
 CASPER Okay, was attitude - how about looking ahead to see if this attitude is going to hold throughout the test?  
 CAPCOM Okay, I'll check it.  
 CASPER Thank you.  
 CAPCOM The attitude is good, Ken.  
 CASPER Okay.  
 CAPCOM Okay, Ken, we're ready to go. Do you think VOX might make it easier for you?  
 CASPER Yes, sir, I'll go to VOX now and Orion -  
 Are you still working on your 52?  
 CASPER Okay, I'm going to have my head in the cockpit here for a while, but if Mr. Kettler isn't a high school drop out, why we won't hit any how.  
 CASPER Okay, Houston, here we go. I'm gonna run over the switch configuration that I got in the cockpit. We're going to do this everything except calling P40 or do you want to call P40 for something?  
 CAPCOM We don't need P40.  
 CASPER (garbled) do not want P40.  
 CASPER Okay, I got the circuit breakers are all checked over on panel 8, the only ones that are out are CS logic to the probe and the stuff on the bottom rows that don't matter. Okay. The switches for SCS are in limit cycle OFF, deadband mend, rate low. I've got the rotation powered AC directs are OFF. I've got my B mags, I'm going to unguage 'em now. The're unguaged. I'm going to SCS control. Okay, now I'm going over and catch the bus ties. Here comes bus tie AC. It's on. BC is on. Thermal power number 1 to AC 1, number 2 to AC 2. Start pitch, gimbal number 1. Mark. And YAW gimbal number 1, mark. I have a thumb wheel drive. I'm driving it from zero to minus one half to plus one half, which is the trim. The YAW thumb wheel is at plus one half. I'm going to take it

APOLLO 16 COMMAND MODULE COMM. CST 14:41 GET 98:48 CM-13/2

CASPER to zero and back up to 1. And will set it at 1 22. It runs smoothly in both directions. I'm making an MTVC check in PITCH. There's a little plus PITCH, a little minus PITCH, that's good, a little minus YAW, a little plus YAW, that's good and stable. I'm going to CMC control. Mark. I have no MTVC. I'm going clockwise on the translation head controller. Mark it. I still have no MTVC. I'm bringing on the PITCH 2 gimbal. Mark. I'm checking the thumb wheel down to zero, up to 1, back to one half. The YAW thumb wheel going over to 1 and let me try it again.--

END OF TAPE

APOLLO 16 COMMAND MODULE COMMENTARY 4/20/72 98:58GET 14:51CST CM-14/1

DEAD AIR

END OF TAPE

CAPCOM Hello, Orion and Casper, this is Houston.  
SC Go ahead, Houston.  
CAPCOM Roger, it looks like we're not going to have a decision on this rev, and we do have the capability of spending about 5 revs in this configuration before we have to make that decision. We would like ya'll to move in to a station keeping position, and you should be at the focus point of approach at about 100 hours. And we're recommending a CSM active -- move into a position (garble). And we're going to run some simulations down here on the CVC problem and we'll get back to you.  
SC Roger.  
CAPCOM Casper this is Houston, you copy too didn't you?  
ORION Roger, he reads you.  
CAPCOM Okay.  
CAPCOM Orion, this is Houston. We want to try another feature here to improve our com. We want you to secondary power amplifier.  
ORION Okay. (garble)  
CAPCOM Orion, this is Houston. Will you confirm that you changed power amplifiers?  
ORION That's affirmative.  
CAPCOM Roger, copy.

END OF TAPE

CAPCOM ORION, this is Houston. Will you confirm  
that you changed power amplifiers.  
ORION That's affirmative.  
CAPCOM Roger. Copy.  
CAPCOM ORION, let's go high bid rate.  
ORION You have high bid rate.  
CAPCOM Roger.  
ORION Hey Jim this is ORION. Could we close off  
main B and just cross C system A.  
CAPCOM Standby. ORION we're happy with your present  
RCS configuration.  
CAPCOM ORION this is Houston -- you're in 2, if you  
go to data we'll send you date vector. Over.  
ORION Rog. You have it. Go ahead.  
CAPCOM Roger. And ORION, we're 2 minutes from LOS.  
ORION Copy Jim and we're going to up data link to  
all.  
CAPCOM ORION we're finished with your computer.  
ORION Rog. Thank you much.

END OF TAPE

CM Joe, I think that total is still slightly retrograde. Yeah, I'm thinking maybe I ought to go put some more in there. What do you think?

CM Okay.

CAPCOM Okay, 16. This is Houston. We still don't have an answer. People are working very feverishly.

CM Roger.

CM (garble) shows 9.2. Why don't we get them to get an arc on this? I guess I'd like to know how good my vector was to start with.

CAPCOM I'm sorry I can't hear you.

CM I know but my state vector is good.

CAPCOM How good is it?

CM That's what I'd like to know from Houston.

CAPCOM Stand by Ken.

CM Rog, I'm trying now.

CAPCOM Go ahead Orion.

DUKE Houston you read Casper?

CAPCOM Roger. That looks that way to us Charley.

CM Houston, do you read Casper.

CAPCOM Yes, Casper. This is Houston. Read you loud and clear.

CM Okay. Looks like we got a 100 hours is a bad time and I tried to close at him before he realized that it was all -X. I put in about 3 and half foot per second and got to checking, that didn't look like the right thing to do so I took about 3 of that out and I'm doing that Jim. And so I took about 3 of that out and I put in half per foot per second radial at about 100 hours and 5 minutes and I put in the rest. Took 2 foot per second posigrade and about 100 hours 6 minutes and about 100 hours and I put in 3 stop roughly retrograde. And my computer now shows 16.5 by 9.2. And I had a good state vector when I started and that's probably a good value by whenever you get a short (garble) OMNI.

CAPCOM Roger. We copy Ken.

CAPCOM Orion, this is Houston. We're wondering where you got the estimate of seven tenths of a nautical mile range. No that's fine.

DUKE Yeah, I show us now about nine tenths of a mile. Is that correct?

CAPCOM Okay, and still hoping.

CAPCOM Roger. We concur down here.

CAPCOM Okay, Casper, this is Houston. We're recommending that you null the line at sight range and fire 5 feet per second toward the LM.

CM Okay. That's still going to be mostly retrograde it looks like. That's how I got in this place to start with.

CAPCOM We copy you Ken.

APOLLO 16 MISSION COMMENTARY 4/20/72 CDT 1558 GET 100:04 CM-17/2

CM                      Okay, I'm going to hold. Can you get a  
short arc going on my trajectory.

END OF TAPE

CAPCOM Okay, Ken, we show you coming up on perilune now, so you'll be affecting your apolune.

CASPER You show me coming up on perilune?

CAPCOM That's affirmative.

CASPER Rog. My state vector shows 19 miles up, and we're not - I'm just passing Smythii. Is that - does that sound reasonable, we shifted that much in orbital track?

CAPCOM Okay, that sounds good, Ken.

CASPER Okay, I guess I'd like for you to summarize again where I stand. I'm a little bit confused now, Jim.

CAPCOM Roger. We were hoping that -

CASPER I'm just passing Smythii, and my altitude - (garble) my computer - Was my state vector a little bit off to start with?

CAPCOM We think your state vector was fairly accurate, Ken. And you'll be at perilune in 15 minutes.

CASPER There's still a discrepancy in -

Okay, that makes more sense. Alright. Because I'm presently at 19 miles, and I think that's probably a good estimate. Alright if I do - You want me to thrust toward the LM now, because I'm approaching perilune, is that affirmative?

CAPCOM That's affirmative.

CASPER Okay. This is using up a great deal of RCS which is going to violate the next line. Is this preferable to trying to do regular rendezvous now?

CAPCOM Ken, could you give us your position relative to the LM?

CASPER Yes, sir. I'm ahead of him and slightly below, and I show a mile on the EMS and I don't know what John has on the radar.

CAPCOM Okay, we copy your position as ahead, below, and about 1 nautical mile.

CASPER That's affirmative.

CAPCOM Roger.

CASPER Okay, Jim. To make sure there's no confusion, I haven't done anything yet.

CAPCOM Okay. Stand by.

CASPER Thank you, sir.

CAPCOM Okay, Casper, this is Houston. We're convinced that we want you to fire directly at the LM at about 5 feet per second. We want to get a positive closing rate.

CASPER Okay. That's in work.

CASPER Okay. It looks like the DAP isn't stable now. How about if I give it a Verb 46?

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 16:08 GET 100:12 CM-18/2

CAPCOM Roger. We copy.  
CASPER Is that a good idea?  
CAPCOM Ken, we show you in 3.  
CASPER I am now, but I wasn't -  
CAPCOM Okay.  
CASPER Does that mean I'm clear to do a Verb  
46? Okay. No, it still didn't work. I think maybe I've  
had one of those transients. For some reason, every time  
I pick up CMC Auto this thing starts doing maneuvers.  
CAPCOM Orion, let's go low bit rate.  
CASPER Okay. I've got it under control, now,  
Jim. I had a bad DAP.  
CASPER Okay, we'll now put in 5 feet per second  
directly at the LM.  
CAPCOM Casper, this is Houston. Hold up on  
that RCS maneuver.  
CASPER Okay. I've put in 3 feet per second.  
CAPCOM Hold up, Ken. Okay. Hold it there.  
CASPER Okay. Holding at 3.

END OF TAPE

APOLLO 16, COMMAND MODULE, 4-20-72, CST 1618, GET 100:22 CM-19/1

PAO We would like to re-emphasize that this will be strictly for station keeping. Lunar landing is still not positively ruled out at this time, depending on what decision is made on the reliability in the stabilization and control system to control the SPS engine on the service module. Continuing to monitor air-ground from both spacecraft. This is Apollo Control 100 hours 24 minutes.

CAPCOM Gordon to Moon.

CASPER Okay, I guess I have, Houston, if you want me to go line of site all the way in -

CAPCOM We need a range and range rate reading now.

CASPER Roger, that's affirm.

CASPER 10,000 feet closing at 3 feet a second.

And we have a line of site rate.

ORION How do we copy?

CASPER Fine, Charlie, stand by for (garble).

CAPCOM Yes, CASPER, this is Houston, you should null the line of site rates.

CASPER Okay, and do you want me to keep them nulled and go all the way in? Is that the idea?

CAPCOM Roger, keep a positive closing rate.

CASPER Okay, might be expensive, but we'll do that.

CASPER Okay, your going have to - your needles are better than mine, why don't you tell me what to do there, John.

ORION Wilco, that's sure toward the Moon.

That's affirm.

CASPER How's that now?

ORION Okay, that's a good place to stop. Okay, I just need some gounches to win and I got it nulled. How's that?

CASPER Okay, what's my range rate?

ORION Okay, still going down.

CASPER Okay.

CASPER Looks to me now like I'm drifting the other way. Okay, I'll believe your needles. Range rate. Okay. Is the rate starting to build now?

ORION I'm trying to calibrate the dead band activity here so I can tell what the - when it really a rate and when it just deadbanding.

CASPER Okay, thank you.

CAPCOM ORION requests to you select a secondary transmitter and receiver.

CASPER Okay, Houston, ORION says that they have already selected the secondary.

CAPCOM Read you loud and clear, ORION.

APOLLO 16, COMMAND MODULE, 4-20-72, CST 1618, GET 100:22 CM-19/2

CAPCOM 16, no answers yet, we're still looking  
at it.

CASPER Okay.

CAPCOM Okay, ORION, this is Houston, we'd like  
you to open the primary power amp circuit breaker on 16.

ORION Roger.

CAPCOM Okay, ORION, let's go high bid rate.

ORION Roger.

END OF TAPE

ORION Okay, let me try this one.  
CAPCOM Okay, we can't hold high bit rate, request you go back to low bid rate ORION.  
ORION Is that the right direction. Okay, that's up for me -- it looks like it ought to be down for you. Okay.  
CAPCOM ORION this is Houston. Can you give us a range and range rate readout.  
CAPCOM Roger. 4900 closing at 5.  
ORION Okay. And this is expensive. Rates (garble). Okay. We're going to keep (garble) this way and we have some fuel point at which to cut off and switch over to LM power. It's really showing and I don't know how much more we're going to see on the way in and I'm reading, of course these gauges don't tell you exactly what it is -- but I have -- that's 65 percent showing on B. And all this stuff is going to be in the -- in the Z plane. Houston you got any thoughts on the cutoff point on Narcisus.  
ORION Standby Ken.  
ORION Okay, hopefully that's most of it.  
CAPCOM ORION this is Houston is the CSM above you or below you? We hope he's directly ahead.  
ORION 45 degrees above.  
CAPCOM Roger. Roger.  
ORION Ken, they look like they are killed completely on the optics tube. Going to need your checker light here in a minute. We're just getting a little glinted sun light now.  
CASPER Okay, thank you.  
ORION Boy, those rates look steady as they can be. Okay and since we are going to get rendezvoused in the dark, I guess we'll just come up along side and hold stations.  
CASPER All right, sir. (Garble) right. Yes, that's what I mean, you would thrust -- you would thrust up. Okay, I think I got it killed again. What's the closure rate now?  
ORION 3 and a half feet per second.  
CASPER Okay, all I've got's the track align -- lost the rest of your image.  
CAPCOM Okay CASPER this is Houston. You might pick up a temperature caution light on your quads but it's of no consequence.  
CASPER Okay, yes I see B is up high. Is that due to the thruster activity.  
CAPCOM Affirmative, Ken.  
CASPER Or is that due to heater fail on.  
CAPCOM I think it's thruster activity.  
CASPER Okay. Rog.  
CAPCOM ORION this is Houston. Will you give us another range and range rate John.  
CAPCOM Are you at 3100 or 3 and a half.  
CAPCOM Understand 68 degrees.  
ORION Okay, let's watch that for a minute before I start working on it because we haven't had any plain component

APOLLO 16 MISSION COMMENTARY 4-20-72 GET 100:32 CST 16:28 CM-20/2

ORION                    before. How's the line of sight rate  
doing now? Holding.  
CASPER                   Okay.  
ORION                    And range rate?  
CASPER                   Okay.  
ORION                    Now we must be going in the right direction.  
CASPER                   Yeah.

END OF TAPE

CASPER Now we must be going in the right direction, then.

CASPER Okay, I'll take some of that out. That means I go to the south, right? How's that? Right direction? Okay.

CASPER Okay, it looks like I'm picking up a rate in the opposite direction in the (garble). Okay. All right.

CASPER This is very much like the simulator where, because of the (garble) you - it looks like it takes a long time to pick up one of those rates.

CAPCOM Orion, this is Houston. We want you to get the rendezvous radar and the tracking light off as soon as it's feasible to conserve power. We understand.

CASPER Okay, it looks like I may be a little more to the South. Okay.

CASPER How about that rate to the South, it looks like it's building again. Okay.

CASPER Hey, I show quite a drift rate now, John. Do you still show no out of plane.

CASPER Okay. It looks like -- I'm going to take some of that out.

CASPER Can you tell if I'm going to -- maybe I took that in the wrong direction although I'm sure that that was the right. South is to your left, isn't it? Okay, we're going the right way then.

CASPER We've been going the right direction all along then.

CASPER Okay.

CASPER It seems to be I'm still a little bit out of plane. I guess that's the sensitivity there are of radar.

CASPER Okay. How's my closer rate.

CASPER Well, that's why I just wondered to be a little bit more plus action.

CASPER Okay, I'm going to put in a foot plus action.

CASPER Okay. While we're using brute force, we might as well.

CASPER Okay, that's about a foot.

CASPER How about that?

CASPER I can see the LM in earthshine now.

CASPER Okay, what's my range rate now?

CASPER Okay, give you another foot.

CASPER Okay, there's another foot per second.

CASPER Okay, I don't think those people are as good as we're using them in here.

CASPER It looks like I need to start reversing my inplane direction.

CASPER Okay, do I still have a positive enclosure

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CASPER           rate?  
CASPER           Okay.

END OF TAPE

ORION                    Okay, I'm getting you centered back up in the COAS. Okay, do I still have a closure rate? Do I still have a closure rate? Okay. Looks like the old EMS is just sort of sitting here looking at itself. Okay, I'm going to go ahead and use the EMS on the COAS on this thing because that's working out pretty good in here. Seems to be more sensitive indicator out of plane. (garble) Just barely drifting in the COAS. Pretty good here. Yes sir, in earth shine I can see the whole LM now. I'm afraid we're going to run out of Earth shine here before we get it completed. How's the closure rate now? Okay. Man that Moon in Earthshine is really something. Rog. I didn't quite get it stopped. That looks to me like that's fixed. You still show some residuals? Okay.

CAPCOM                    ORION this is Houston, we're showing about 10 minutes to LOS and I have some words for you on our general plan when it's convenient. Okay, when you come up on AOS, on the next rev rev 15, we'll give you a go or no-go for another try and we'd be looking at PDI on rev 16 and at that time we'd have pads for you and procedures. Over. And CASPER, this is Houston.

CASPER                    Go right ahead.

CAPCOM                    Roger, we want you to verify that you're in AUTO dump on the water. That's pressure relief in the number 2 position. That's vertical and if you have an opportunity to get away from the controls there, we'd like you to manually dump the water to 10 percent on the back side. That should require about 17 minutes. Over.

CASPER                    Okay. I am in AUTO dump and I'll have to wait until we get in daylight to go down there I think.

CAPCOM                    Okay, we copy.

CASPER                    (garble) I guess it isn't.

CASPER                    Okay. How's my closure rate?

CASPER                    Okay. How's the auto plane? All right.

CAPCOM                    Orion, this is Houston. We would like you to configure for RCS Bravo only, over.

CASPER                    Alrighty.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 16:59CST 101:05GET CM23/1

CASPER                   Alrighty. Now that's what I was looking to say - we're going to lose earthshine here in just a minute. Yeah, (garble) things you're talking about. Fix it. It's really strange to be sitting here in the COAS here, right in the middle. You are upside down compared to me and when you say down you mean you're going - you're going down on me - is that correct? Okay. It still doesn't seem like it does much. Okay I show a lot of height rates that was officially killed. 14. Yes sir. How much? Okay. I can see your image is about 2 degrees now.

CAPCOM                   16, this is Houston. We're showing about 2 minutes to LOS and if you'll give us a range and range rate and, Ken, perhaps you could repeat it for us.

ORION                    Did you copy that, Houston. The range is 710 feet, 2 feet per second, rates nulled. Did you copy, Casper?

CAPCOM                   Roger, we copied down here. Thank you.

CASPER                   Okay. Unhuh let me turn my spotlight now.

CAPCOM                   Yeah, I can tell I got you but it's a poor competitor for earthshine. Beg your pardon. Rog. It will all of a sudden look very nice. You can rendezvous into these conditions very nicely, the only problem being that you've got to keep referring to the reticle to get some kind of range, because you just don't have enough good depth perception to tell where you are.

CASPER                   Okay, in order to have good COMM, man you just disappeared at the spotlight on. I tell you the spotlight isn't nearly as good as earthshine. Really surprised.

END OF TAPE

ORION We got AOS, let's wait.

CAPCOM Orion, this is Houston.

ORION Hello, Houston.

CAPCOM Roger. I have some switches and circuit breakers we want you to take care of to try to improve the comm situation. I'll get them to you as soon as you're ready to copy.

CAPCOM Okay, we want on panel 12, track mode switch OFF, on panel 16 primary transmitter receiver circuit breaker OPEN, F-band antenna heater circuit breaker OPEN, F-band antenna comm circuit breaker OPEN and primary S-band power amplifier OPEN. Then on panel 11 AC BUS S-band antenna OPEN. Over.

CAPCOM That's right, track mode switch OFF on panel 12.

CAPCOM It's a long day, and did you copy those circuit breakers, Charlie? Okay, and you do have a GO for another try here at EDI on REV 16, and I have some words on that problem with the TDC whenever you all are ready to copy.

ORION I've got my pencil ready.

CAPCOM Okay, Orion can always tell Casper what his problem is, but it looks like an open circuit in the rate feedback and your serval loop. We've run exhaustive tests down here on the west coast and east coast on controllability aspects and structural aspects and everything looks satisfactory. On Apollo 9 we ran a - a similar test was run, as you probably remember, and if such a problem did occur up there, you could expect oscillations, of course, of the gimbal, but you could expect a steady attitude, it would be a limit cycle. So we're convinced down here that we have a satisfactory control mode if we have to revert to that one. Over.

CAPCOM And I hope Casper copied.

CASPER Okay, Casper copied that. I guess I'd like to note, is that thing going to diverge up to a point and then cease to diverge? Does it become neutrally stable at some amplitude, Jim?

CAPCOM That's affirmative, Ken.

CASPER Okay, that must be some number bigger than the one I looked at, and the only other question I had is "Is there any connection between this, in your mind, and the longer duration gimbal ON times?"

CAPCOM Okay, the answer to that, Ken, is negative.

CASPER Okay, sounds good. Thank you.

CAPCOM Casper, Houston. We're on 2 loops now.  
CASPER Okay, Henry. Thank you.  
CAPCOM Hey Ken, I've got a couple other words  
about that if you'd like to listen.  
CASPER I surely would, Stu.  
CAPCOM Okay, most of the cases where they  
appeared to be diverging to you and you shut off the motor,  
would short, and some of them were just very close to the  
point at which it became stable. And on some of the longer  
ones, we did see the stability, but those that you called  
diverging were short of reaching a stable point. It appears  
that the controlability is not going to be any problem when -  
if you would have to burn with this, according to the stroking  
tests on 9, you'll get a lot of oscillations and you'll feel  
the spacecraft shaking, but the attitude will not be changing.  
You'll probably see the rate needles moving around a little  
bit. And just to - also, what we'll probably do the burns  
with the 90 degree ROLL so we'll have the redundancy in the  
YAW axis platform consideration.  
CASPER That sounds like a good plan. I guess  
if I'd have been a little smarter, we'd have pressed on on  
schedule.  
CAPCOM No, I don't think so, Ken. They appeared  
to be diverging and it was a true diverging as far as you  
could tell, but it was just in most cases, just short of  
stable.  
CASPER Okay, I tell you - you know the difference  
in this and the simulator, where you can really feel it move,  
and this old dog was really wagging its tail.  
CAPCOM Yes, you know Jim was talking about the  
Apollo 9 test, and he said that you really feel it in the  
spacecraft. But this thing is stable, they've really checked  
that out, and it'll rattle and roll a little bit, if you  
have to use it, but it's stable.  
CASPER Sounds good. Once again, the ground  
earns their pay.  
CASPER Okay, Hank. I guess I'm in need of  
a general outline -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 18:02 GET 102:03 CM25/1

CASPER Okay, Hank, I guess I'm in need of a general outline of where we intersect the flight plan, and it looks like one of the things I'll be needing is a kind of a separation burn from Orion again, so that I'm not setting here blasting me into space, and then I'll need CIRC burn pad, and after that, I guess we just sort of stumble along and try to pick up some landmark tracking and things like that.

CAPCOM Okay.

CASPER My fuel is kind of low.

CAPCOM Okay, of course as you know we're working the flight plan now, and Hank's got the PADs for you, and I just wanted to make one other comment now. Do you have any other questions, do you have any reservations about this duty, because we sure want to get, get your concurrence, but everything looks like it's go.

CASPER Okay, did somebody fly one of these CMS?

CAPCOM Well, it's been flown on the hardware evaluated, -

CASPER Okay, I was just wondering if, if anyone's run through these things.

CAPCOM Yea.

CASPER In MPBC or something like that.

CAPCOM Okay, yes, it's been flown in all three modes, can G&N, SCS AUTO and MPBC.

CAPCOM It's also been flown on the, on the hardware evaluator, and of course, we did have the stroking test on Apollo 9, where it was flown in foot, and pretty much duplicated this exact problem as far as cycles per second and so forth.

CASPER Alright, sir. I'm happy.

CAPCOM Very good.

CAPCOM And Hank's got some good words for you here.

CAPCOM Okay, Ken. I have your -

CASPER Thank you very much.

CAPCOM SEP PAD for you. You'll use normal SET procedures, in other words you'll be below the LM facing it, and back away with your minus X thrusters. I'll read you your new PAD, if you're ready to copy.

CASPER Okay, just a second I got my PAD book handy. Okay, I'm ready for a little SET PAD.

CAPCOM Roger. NOUN 33 102 30 all ZIP, attitude 000 357 000.

CASPER Okay, this is SEP. That's at 102 30 00, attitude 000 357 and 000.

CAPCOM Good read back, Ken.

CASPER And this is to be a, a 1 foot per second radial inward.

CAPCOM That's affirmative.

CASPER Okay.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 18:02 GET 102:03 CM25/2

CAPCOM And I have your CIRC PAD for you now, Ken,  
if you're ready to copy.

CASPER Okay, go ahead.

CAPCOM Roger. CIRC SPS G&N 39 095 plus 049 plus  
119 103 21 4243 NOUN 81 plus 00691 all ZIP minus 00435 000 139  
358 00680 plus 00531 00816 005 00701. The rest is NA. Sirius  
and Rigel 131 071 014. 2 Jets, 16 seconds QUAD Alfa and Charlie,  
and then comments manually roll 90° from pad attitude for burn.  
ACCEPT the final attitude and TRIM in P40.

CASPER Okay. Let me ask one question before I read  
it back. I assume that I would be out smarting myself if I went  
through the 90° roll in the VERB 49 maneuver rather than going  
to 0 roll. I'm looking for ways to kind of be stingy with the  
RCS.

CAPCOM Stand by one.

CASPER Let me read you the PAD back and then I'll  
ask you another question, Hank.

CAPCOM Okay.

CASPER Okay, it's CIRC SPS G&N 39095 plus 049 plus  
119 103 21 4243 plus 00691 all ZIP's minus 00435 000 139  
358 00680 plus 00531 00816 005 00701. Sirius and Rigel 131 071  
014. 2 Jets, 16 seconds QUAD's Alfa and Charlie. Manually roll  
90° for burns.

CAPCOM Good read back, Ken.

CASPER And would you like for me to go to AC roll  
for the normal roll control?

CAPCOM Ken, there's too much noise. Can you say it  
again.

CASPER Would you like for me to go to AC roll  
for normal roll control also?

CAPCOM Stand by. That's affirmative, Ken. Go to  
AC roll.

CASPER Okay.

CAPCOM Ken, we're trying to work in a P52 here, and  
we're checking that attitude and then we'll give you what we think  
best as far as that maneuver.

CASPER Okay.

END OF TAPE

CAPCOM Tell them not to talk now because they are hitting the data then every time now in downvoice backup.

CASPER Casper, Houston between now and SEP we're not going to do anything and in the meantime FAO is working on a - whether the burn attitude is going to be good for your P52 or not so just go ahead get SEP out of the way and we'll have some words for you then.

CASPER Okay, looks like they could use a new state vector, too.

CAPCOM Roger, they are working on the vectors now.

CASPER Okay, will it do me any good to load - yeah I can go ahead and load this thing and let them put in a new vector later, is that correct?

CAPCOM Say again.

CASPER Is it okay to go ahead and load P30 and then put in a new vector afterwards, or is it best to wait until I get the vectors in.

CAPCOM Standby a minute, Ken. Ken, go ahead and SEP we'll uplink our cassette.

CASPER Okay, thank you. How about if I do this 90 degrees to that attitude - save - save a maneuver. I'll have to go pretty fast to get there.

CAPCOM I guess there is another 10 questions, huh?

CASPER I'm almost 90 degrees to that attitude and I can do it. Instead of pointing and doing it along the X axis suppose I come down and do this 90 degrees alt and do it with the BD thruster. Playing that 1 foot per second.

CAPCOM Standby, Ken.

CASPER That would get me a pitch attitude of 085 or 087 excuse me.

CASPER Okay, now he loaded his P30 and you're looking at.

CASPER Stu, you are on air to ground. I loaded P30. I have flown to 90 degrees from the attitude in order to save that extra high speed maneuver to get there and I'm going to burn it along the Z-axis. It'll be towards the moon which is our check and I'll take it from 1 foot per second to 2 foot per second as per the normal procedures except I'll be using the Z translation.

CAPCOM Okay, Ken, we concur as long as it's 1 foot down radial.

CASPER Okay, it'll be 1 foot towards the moon and we'll still count from 1 to 2 foot per second on the noun 85.

CAPCOM Roger.

CAPCOM Casper you are go for SEP.

CASPER Okay, go for SEP. Thank you, sir.

END OF TAPE

CAPCOM Just to clarify, Ken. You're going to burn the noun 85 to 0.

CASPER Negative, the noun 85 will go to plus 2. It was loaded so that it would point you in the other direction. If I'd taken it this way, the dummy load we put in was a minus and we normally burned it to a plus 2, I'm going to burn toward the Moon, which is going to make this come out to a plus 2.

CASPER We originally put in a vector, we wanted to burn radially inward, and we put in a vector that would cause you to point radially outward on the calculations and then we just burned it to a larger number so a P40 wouldn't cause you to turn around and point 180 where you were when you undocked.

CAPCOM Roger, copy.

CASPER You have any reservations?

CAPCOM As long as you get a flip toward the Moon.

CASPER Okay, we can do that.

CASPER Okay, it's at 30 seconds.

CASPER Okay, how's that?

CAPCOM Looks okay, Ken.

CAPCOM Casper, Houston. If you'll give us ACCEPT, we'll uplink.

CASPER You have it.

CAPCOM And Casper, when you get through with the uplink, we want to go to an attitude of 000060000 and do a P52.

CASPER Okay, 000060 and 000 and a P52, option 3. And I take it that I should enter 509 just before the P52, and leave it in until after the gimbal drive check in P40, the same procedure we had last time. Is that affirmative?

CAPCOM That's affirmative.

CASPER Alrighty.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 18:32 GET 102:37 CM28/1

CAPCOM Casper, the computers are yours.

CASPER Thank you.

CAPCOM Casper, Houston. We're trying to trouble shoot the LM communications problems and it will help if you go to OMNI Alpha.

CAPCOM Casper, we have a NOUN 93.

CASPER Okay.

CAPCOM And Ken, what we would like for you to do is pick up in the flight plan at 97:07, and with the CIRC crept and just step on through that procedure wise and be sure you do the VERB 49 after the CIRC. I have a change in your PAD attitude -

CASPER VERB 49, what first to take?

CAPCOM Roger, right after the CIRC burn, we want to be sure you do the VERB 49, and to get into the landmark tracking attitude. We're going to do the HIGH 2 landmark tracking, and we've got a change to your pad attitude for your CIRC. We're going to go ahead and give you an attitude that has the 90° in it so the VERB 49 will be more efficient, and the new attitude is 090 139358.

CASPER Okay, 090 139 and 358. I'm on my way now. And I'll get myself into the proper tracking attitude if we don't get all those things worked out.

CAPCOM Roger, and we want to make sure you don't bypass the final TRIM in P40, in that attitude.

CASPER That's affirmative. I will take the final TRIM.

CAPCOM Roger, and in some where in here I need to give you the new abort PAD, whenever you can get the chance to copy.

CASPER Okay, let me get the maneuver started and let me get myself squared away and get the timeline in my head and then I'll give you a call.

CAPCOM Okay, whenever you're ready.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 18:43 GET 102:48 CM29/1

CASPER Okay, Hank, and one question that comes to my mind is, do you want the secondary YAW gimbal brought on the line or not?

CAPCOM Stand by, Ken. I'll get you an answer on that one.

CAPCOM Okay, Ken. What we'd like you to do is leave the secondary gimbal motors off until you have finished the gimbal drive check, then bring the secondary gimbal motors on and do a normal burn, and if you have to, go ahead and down grade, down mode if you have to, to arrest some kind of a bad rate or something.

CASPER Okay. I'll not do, I'll do a gimbal drive check with the secondary in PITCH. Are they in the same package. It seems like there in separate packages. The secondary in YAW is the one I'll bring on after the gimbal drive check.

CAPCOM That's okay, Ken.

CASPER Or would you just rather not exercise it. It's MOX-NIX to me.

CAPCOM It's your druther, Ken. If you want to do it that way, that's fine.

CASPER Okay. It'll just verify that I've got everything else hooked up properly. I'd like to keep this close to the normal procedures as I can. Hey, you did copy the P52 values.

CAPCOM Roger, it looked good, and Orion's trying to call you on VHF.

CASPER Okay, I had turned them off while we were doing our chatter, let me get to them.

CASPER Orion, Casper.

CASPER Orion. Did you call Casper?

CASPER Okay. We'll give it a try again. I did a 1 foot per second radial in towards the moon.

CAPCOM And Ken, in addition to the PADs, I also have your LOS and AOS time.

CASPER Okay.

CAPCOM Casper, Houston. How do you read?

CASPER Loud and clear.

CAPCOM Okay, we lost you there a minute.

CASPER Okay, do you want another OMNI?

CAPCOM Stand by.

CAPCOM Casper, Houston. We're about 9 minutes from LOS and I sure would like to get these PADs up whenever you get a chance.

CASPER Okay, can I catch them when we get AOS, Hank? These are all the abort PADs, right.

CAPCOM Okay, and, but let me give you the LOS and AOS.

CASPER Okay, go ahead.

CAPCOM Roger, LOS is 103 04 51. AOS 103 51 25. Are you interested in sun rise?

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 18:43 GET 102:48 CM29/2

CASPER No, sir. That's alright, thank you.

CASPER Yea, let me concentrate on making sure that  
all goes well in time, Hank, and I'll pick up those support PADS  
at AOS.

CAPCOM Roger.

CAPCOM OMNI Delta, 16, or Casper.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 18:53CST 102:57GET CM30/1

CASPER And Houston, Casper.  
CAPCOM Go ahead.  
CASPER One thing on the plus side Hank is Charlie took a look at the mass spec and said it's all inside buttoned up.  
CAPCOM Did you say the mass spec is all inside and buttoned up?  
CASPER Yes sir.  
CAPCOM Okay, I'll relay that.  
CASPER Okay, and I took the trim maneuver in P40 and it put that bias to attitude B, 90 degrees roll, plus 39 pitch N 1.7 and yaw, that's about right considering the roll.  
CAPCOM Roger.  
CAPCOM Casper, Houston.  
CASPER Go ahead.  
CAPCOM Roger, you have a go for CIRC and when you come up on AOS next time we'd like you to come up in the landmark tracking attitude that is giving us 98.22 that is a little different from the VERB 49 maneuver that was called out right after the CERT burn, it's different in roll, in fact, you should be in attitude 000 276 000. And we want you to do your VERB 49 to that attitude. 000 276 000, rather than a roll of 0 000000 they call for there, right after the CIRC burn.  
CASPER Okay, I'll pick you up on the best antenna.  
CAPCOM Roger, OMNI D, OMNI DELTA.  
CASPER Okay, thank you Hank.  
CAPCOM Ken, we'd like to know if you did a purge when you did the waste water dump.  
CASPER A purge, a fuel cell purge. No sir.  
CAPCOM Okay, copy you didn't purge fuel cells.  
CASPER No, that's correct.  
CAPCOM Ken, if you can work it in, don't jeopardize the burn. Maybe after the burn you can get a urine dump and a purge on all those things so we can get the SIM BAY going later. That's okay. Can't work it in, don't jeopardize anything.  
CASPER Okay, I'll get you a purge in there anyhow.

END OF TAPE

CAPSOM Casper, Houston.

CASPER Hello, Houston, Casper did it this time.

CAPCOM Really good show, you want to give us a report?

CASPER Okay, Okay, the burn was on time and for the right duration and the residuals were plus .2 plus .2 and 0 that was after trim and the attitude for those residuals was 161.38 13296 and 0.12, Delta VC was minus 8.5 the oxidizers 32 the fuel is 34 and decrease-increase--tag that decrease, probably because of the short duration. The burn required a trim the original residuals were plus 1 and plus .6 and plus .7 so I had the roll in order to take out the Z components.

CAPCOM Roger, and would you give us the trim attitude again, please.

CASPER (garble) Okay, I'll give you again the trim attitude and this is for these 2 temp residuals, that's after trimming that was 161.38 132.96 and 0.12.

CAPCOM roger, copy.

CASPER And, Hank, I did complete the fuel cell purge.

CAPCOM roger, copy. You completed fuel cell purge and I would like to get up a P-24 passing.

CASPER Standing by.

CAPCOM roger, it's 16 3 T-1 is 104 19 11, 104 24 01, 104 25 41, 104 26 29, north 3 nautical miles.

CASPER Okay that's 104 19 11, 24 01, 25 41, and 26 29, north 3 miles.

CAPCOM Good readback, Ken and I'd like to get a flight plan change to you there at 98:45 in your flight plan.

CASPER go ahead.

CAPCOM Okay, at this point we want to delete the VERB 49 to 52 -- P-52 attitude, we're deleting the P-52 it's not required, at this time we would like you to go to P-20 option 5 plus X SIM bay.

CASPER Okay, following the completion of the tracking we'll go to P-20 option 5 and plus X. I presently have EMP 509 and running and I will terminate it following the P-24.

CAPCOM That's affirmative. And also I have the abort pads for you that I didn't get up before.

CASPER Okay, go ahead.

CAPCOM Roger, Echo 104 30 all zips, Foxtrot plus 01023 all zips minus 00500, Golf 105180000, Hotel 107054500, India 104172329, Juliet 107054500, Kilo 109043000, Lima 104421664 Mike 111033000, November 106251181,

CASPER Okay, Hank, starting with Echo 10430 all zips, Foxtrot plus 0102.3 all zips minus 00500, Golf 105180000 Hotel 107054500, India 104172329, juliet 107054500, Kilo 109043000 Lima 104421664, Mike 111033000, November 106251181, Over.

CAPCOM That was a good readback, Ken, and Stew would like to give you some words on the rendezvous.

CAPCOM Okay, Ken, I got a couple of comments about an event of a PDI abort as far as the rendezvous scheme and you might want a sheet of paper there and jot down a couple of things.

CASPER Okay, I got a little corner here.

CAPCOM Okay, we're going to do the navigation end, SCS and in other words the marking routine and we'll use the CMC to maneuver to the burn attitude and set us up for the tracking. We'll burn in SCS and there are 3 places through here that you'll can activate that relay if you're using the normal procedures. Now we've got some detailed procedures we won't read to you now, if we get in that situation we'll talk to you, but the 3 times that you want to watch out for are don't place, the spacecraft control, and CMC with the OPTICS mode in manual, think you're probably pretty familiar with that one. Don't respond to the 204 display, with the spacecraft control in CMC, and if you make a burn you'll probably be trimming it with G&N and wait until you've got your VERB 16 your NOUN 85 display up before going back to CMC and we can talk about it in detail, like I say, later if we need it. We're on a couple of these and they go pretty smooth.

CASPER Okay, Stew, the way I understand the scheme is that for attitude holding while we're doing navigation we'll do it in SCS and when we're ready to go to work while we'll do CMC maneuver to the burn attitude and make the burn in SCS to avoid this relay again. And we don't ever want to go to CMC control with the OPTICS in manual and we don't want to respond to 204 with the CMC command. And the 3rd one I didn't copy.

CAPCOM Okay, if you do a burn in your SCS you depending on what you've done there, Ken, you'd probably end up with a wheteher your flashing 99 display and we want to make sure that you go on to your NOUN 85 display, before you go to CMC then go ahead and trim with G&N residuals.

CASPER Okay, Houston, Rog. understand. We don't want to go through that transient at the end of P-40, certainly.

CAPCOM Righto and that one thing too --

CASPER (garble) do not respond to 204, Stew. If they don't respond to that do you mean don't even enter on it go right past it?

CAPCOM That's exactly what I mean. Don't enter on it, of course you'll be doing the SCS burn but don't enter on that or you will activate that relay until you switch the spacecraft to SCS control.

CASPER Okay, as long as it's in SCS control, though I can by-pass the 204 with no problem.

CAPCOM That's affirmative, Ken, if you hear an SCS control that relay power is interrupted, the power to

CAPCOM                   that relay goes through the spacecraft control switch and it's got to be in CMC.

CASPER                   Okay.

CAPCOM                   And one other point I'd like to clarify, Ken, is that for your tracking after you go to your track attitude CMC will start you off on rate drive and then go to SCS control and go to a minimum impulse and PITCH and just every now and then you might have to flip it like between PPI and midcourse 1 it just took one minimum impulse time and kept me right up around the 22 degrees trunion.

CASPER                   Rog. Sounds like you've been working, too.

CAPCOM                   No, you've been doing all the good work there, Ken.

CASPER                   Doesn't sound like you guys have gotten any sleep if you've checked out all these things, plus today's problem. Whoever put that story together today deserves a life supply of whatever he wants.

END OF TAPE

CASPER Doesn't sound like you guys have gotten any sleep if you've checked out all these things plus today's problems. Whoever put that story together today deserves a life supply of whatever he wants.

CAPCOM Watch what you say, Ken, you don't want to overload your pocketbook there. And I'll give you back to Hank.

CASPER Okay, thank you sir.

CAPCOM Rog.

CAPCOM CASPER, Houston, I'd like to remind you to get your (garble) direct power off.

CASPER Thank you sir.

CASPER Hank, seems to me I still have my logic power off from early this morning and maybe I missed where it comes back on. This is the panel 181 logic. Did you get any words on where you think that ought to be?

CAPCOM Okay, Ken, you can leave it off for now. And after we get into SIM bay attitude after land mark tracking we're going to bring up some of the SIM bay.

CASPER Alrighty.

CAPCOM CASPER, Houston, we're go for PDI on the CSM side.

CASPER Okay.

CAPCOM CASPER, I have a mapping camera, pan camera photo pan for you if you think you can squeeze it in between now and T1.

CASPER What do you show for T1, maybe I'm out of whack.

CAPCOM Roger, we've got about 7 1/2 minutes to go.

CASPER Okay, looks like this attitude is gonna be just about the one for T1 then, huh?

CAPCOM Roger.

CASPER Let me hold off until I get this thing loaded then.

CAPCOM CASPER, Houston, we're showing a difference here between your actual CDU's and your final CDU's. Doing good now, CASPER.

END OF TAPE

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CAPCOM You look good now CASPER.

CASPER Okay Hank, tell me again what you just said about the CDU's.

CAPCOM Okay, we're getting some bad data down here, so really we can't be sure but it looks like you ought to be about 285 pitch. Is that right?

CASPER Correct.

CAPCOM It looks good from here now Ken.

CASPER Okay. And Hank I'm going to turn my VHF transmission on and I'll be listening to you but I won't be answering until after they land.

CAPCOM Roger. Copy. CASPER coming up on 10 seconds to T one. CASPER coming up on time for DAC on.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/20/72 CST 20:18 GET 104:24 CM-34

CAPCOM About T-2, Casper.

MATTINGLY Henry, I'm standing by to copy. Do you  
want me to take that band from this Option 5 or Align?

CAPCOM Stand by, Ken. I'll get an answer  
for you. And we're working on whether we got a stay or  
not for T-1.

MATTINGLY Okay. Sounds like they did pretty  
good.

CAPCOM They did a beautiful job.

END OF TAPE

CASPER Sounds like they did pretty good.  
CAPCOM They did a beautiful job.  
CAPCOM Uh, Ken we'll one a narrow deadband on that.  
We're - - we got a camera pass coming.  
CAPCOM Casper, Houston. Orion is stay T one.  
CASPER Okay. Thank you.  
CAPCOM And Ken, while you're maneuvering to this  
P20 attitude like to tell you about the flight plan.  
We want you to do everything that's in the flight plan thru  
(garble) up through what's in your flight plan  
at 99:20. And then we'er in the process of getting you a  
whole new thing to operate from. And I have you a mapping  
camera, a pan camera photo pad.  
CASPER Okay, Yeah, I don't mind taking my suit off.  
And okay, I want to give you those pads now.  
CAPCOM Okay. Mapping camera, T-start 105 29 27,  
T stop, 108  
CASPER Wait a minute Hank, I don't have any place  
to write these things, I don't think. I have to go look for  
them. Thank you.  
CAPCOM Okay.  
CASPER What's the best place to work from, the  
basic timeline with the real GET's.  
CAPCOM I'll tell you what our overall plans is Ken,  
we want to get in the camera passes tonight. Their terminator  
passes, before we loose your opportunity cause it's terminator  
is moving. And then we're going to do a clock sync some-  
where during the night and scrub and get back on the flight plan.  
We'er going to scrub out about 6 hours or so.  
CASPER Okay. I tell you what I got a page here  
that I can work on. Why don't you give me a summary of the  
next couple hours here. And I'll just write it out someplace in  
here.  
CAPCOM Okay, standby and I'll see if I can get  
something worked up for you.  
CASPER Go ahead and give me the check pads - yeah,  
I ought to have those - next rev (garble)  
CAPCOM Casper, Houston, you are almost unreadable  
I'll have to wait until we get a little bit of COMM.  
CASPER Is that better COMM now.  
CAPCOM Hey, that sounds much better. We're putting  
together a little summary here for you..  
CASPER Could you not pay attention to the OMNI's.  
CAPCOM Okay.  
CAPCOM Casper, Houston could you bring up the high  
gain pitch +41 yaw 228.  
CAPCOM Casper, Houston I have you a little run  
down here for the next rev, if you are ready to copy.  
CASPER Okay, all set.  
CAPCOM Okay, at 105:20 MC flag LA cover OPEN.

END OF TAPE

CAPCOM Okay, at 105:20 MC/LA cover open. 105:23 MC extend. 105:28 LA hold. 105:29 PC standby, stereo, power, operate (T-start). MC image motion, increase (barber pole)/On. MC on, (T start). 105:50 AOS, 105:50 same the SIM Bay activation. MS deploy to 8.4 feet at 61 seconds. GR deploy to 7.5 feet 53 seconds, that's 53 seconds. Then MS experiment on, ion source standby. AP, that should be alpha P/XR cover open. XR on, 105 59 PC mode standby (T stop). Power off (MSFN Q).

CASPER Okay, you ready for a readback on that or have you got some more to fill in?

CAPCOM Go ahead and read that back and then I can give you your pass.

CASPER Okay.

CAPCOM Standby there Ken.

CASPER If it will help you any, I'd be glad --

CAPCOM If you'll give us POO and ACCEPT, we'll up-link your state vector while you're doing that.

CASPER How about if I just give you ACCEPT?

CAPCOM That'll do it fine.

CASPER What if I'll suggest if it'll help you in -- do whatever is easiest is -- I'll be glad if you want to give me the code and tell me to have it -- have the SIM Bay in a particular code by a given time.

CAPCOM Okay, that's a good idea.

CASPER In the front side I'll just sort of hussle around and do whatever you suggest until we get back to a written flight plan. I do need about 20 minutes here somewhere to get the suit off and get the cockpit stowed. It looks like a disaster area.

CAPCOM Okay, I concur in that. Like to give you the pass now if you're ready.

CASPER All set.

CAPCOM Okay, mapping camera pad is T start 105 29 27 T stop is 108 28 13. Pan camera T start 105 29 27 T stop 105 59 27. And -- just pointed out that it made an error here at 105 29 in your flight plan. The image motion should come on after T start with this mapping camera. That was a procedural error.

CASPER Rog. I understand that. No sweat.

CASPER Okay, let me read back to you what I have. 105 20 you want the mapper door open. At 23 we want to extend it. 28, the laiser altimeter comes on. 29 we get the pan camera to stand by stero and power to operate at T start which is 105 29 27. The mapping camera comes on at 105 29 27. The IMC comes on and we put it to barber pole on the image motion. At 50 we'll get AOS and we'd like to have SIMBAY activation. It's my understanding you'd like for me to hold SIMBAY activation until we're within AOS.

CAPCOM That's affirmative.

CASPER (garbled) deploy to 8 feet, which is 1 plus 01. I got you answer, thank you. Gamma-ray deployed to 7 and a half feet, that's 53 seconds. The mass spec experiment on and the ION source is stand by. The Alpha X-ray door comes open, the X-ray goes on. At 59 27, the pan camera mode goes to stand by, and the power comes off when you give me a call.

CAPCOM That's a good readback, Ken.

CASPER Okay. I think we've got it made. We may get caught up yet.

CAPCOM Okay, and I guess we start bringing it on, Ken. We ought to bring the S-band off the TV to site, so we can get the data.

CASPER Okay. Any harm in my doing that now, so I don't forget it?

CAPCOM Go right ahead.

CASPER Okay, you've got it. And when we get AOS next time, I'm content while we're reading things up, I'll be prepared to copy some things, and be prepared to hop around and reconfigure whatever you need in real time.

CAPCOM Okay, that's real good, Ken. Go ahead and get your suit off, and get comfortable.

CASPER Okay, I'll, I'm just about to the point where I'll take my comm carrier off so I'll be off comm here for about 10 minutes. What's LOS time?

CAPCOM Roger, we have LOS in about 12 minutes. Some where around 03.

CASPER Okay. I may not be back up for that, but if not, I'll just execute this flight plan.

CAPCOM Roger, Ken, and good work.

CASPER You guys did all the work today. I tell you, if we ever get a chance to look out that window - it's going to stand you on your ears.

END OF TAPE

DUKE I tell you, if we ever get a chance to look out that window, it's going to stand you on your ears. That earth shine is as spectacular as any of the other things which is much to my surprise.

CAPCOM I hope we're in a position now, we can get on to doing some looking.

YOUNG Well, now, keep it a little bit there, and we can have an lot to do while we're spinning around and -- some of those low REV's came up with some very interesting observations. In particular, the one that strikes me most vividly is the fact that the -- if you remember all those apparent lineations we saw on Silver Spur and the places around the Hadley in the pictures.

DUKE Those same kind of things appear all over the surface of the moon down low. It's just everywhere I look; in the area where there's any topographical relief and they go in all different directions. I hadn't been able to sort out if there's some preferred direction or some reason for it. What I did happen to notice is I came across the Theophilus in one of the passes. What you -- you see this in the walls of the Theophilus cause of the interior and in the places where there are craters around the outside or some kind of -- it looks like some fracture or something of that nature. It goes across the Theophilus or into it. You see what looks like a reflection in the leaf patterns. If you had a crater on the rim, these patterns would sort of show like you'd expect from a shock pan and they'd be radill and concentric to that crater, and these little lines seem to take that kind of a twist, and the fact that some of them go along with that topographic hives. I'll see if I can get some photos. I didn't take any photos on this stuff cause I didn't have a chance, but I looked out and saw some of these things and they're just everywhere.

CAPCOM That sounds like a real interesting observations there, Ken.

CASPER Okay, I'm going to get my suit off and if I don't catch you at LOS, I'll see you at AOS.

CAPCOM Okay.

CAPCOM The computer is yours, Ken.

END OF TAPE

CASPER Hello, Houston. Casper.  
CAPCOM Casper, Houston. How do you read?  
CASPER Loud and clear.  
CAPCOM Casper, Houston. We need barber pole plus 3  
on camera.  
CASPER Okay, 3. You have it, and would you remind  
me when you get to about 30 seconds from pan camera to stop.  
CAPCOM Will do.  
CASPER Okay. I want to mark something on chart, and  
then I'll talk to you for just a minute.  
CAPCOM Roger.  
CASPER Okay, and I put the battery A on charge at  
105:35.  
CAPCOM Roger, copy.  
CASPER I got you out the window now, but it looks  
like, like half of you has gone away. It's all black.  
CAPCOM I hope we're in the sunny half.  
CASPER No, I bet your in the dark half, aren't you.  
CASPER That shows how long it's been since you've  
been outside.  
CAPCOM It has been awhile.  
CASPER As I came over, I finally got squared away,  
and as I came across King, I had the binoculars out, and sure enough  
on the central beach down there, the things we've been  
dabating for so long about whether they were streaks or out crops,  
or what they were, are large blocks which are on the, the central  
peak, most of the block seem to lie on the eastern side of the  
peaks. However, there are a few blocks on the western side and  
enough that you can tell the reason that they looked dark is they  
cast a pretty long shadow, because they are pretty huge blockes.  
The floor looks like it's, it looks like an old mud flow. It's  
really a strange looking floor. It's got lot's of flow bands and  
patterns in it. In the crater rim to the west on the interior shows  
at least 3 distinct shades of this gray. The upper one is the same  
color as the surface, which is a light sort of a darker gray, and  
then there's a light gray band, which runs parellel to it, and  
then the dark band came below that. And the light band is perhaps  
a quarter of the depth of the crater wall. To the north and west  
of King, I ran into somethings that looked like the same sort of  
swirls we've been looking at up around (garbled) and around Riner  
Gamma. These two are in the highlands, and with the binoculars  
it's my impression, that these probably have a certain amount of  
relief topographic relief with them. But they look, when you look  
straight down on them, they look exactly like the other things  
we've been looking at, and I took a quick picture of that thing  
and I put it on magazine Victor and if you'll keep a record of  
these things, that one is on Victor at exposure, oh, excuse me,  
that's magazine November-November, and that's exposure 41.  
CAPCOM We got that, Ken. And Casper, could we get HIGH  
GAIN auto?

END OF TAPE

CAPCOM And Casper, could we get high gain AUTO?  
CASPER You've got AUTO now. And it's oscillating, suppose I go back to - there it is. Okay, I have a little tone in my headset that was beeping very softly and the signal strength was doing the same thing.  
CASPER Roger. You want to go block on the computer, Ken, and we'll show you the optics per the manual.  
CASPER And Ken, you're about 10 seconds from pan camera off.  
CASPER Okay, the computers in block, okay.  
CASPER I was a little late with that one.  
CASPER Okay, no sweat, we got it done. I'll check the optics. And when you're ready I'll start configuring the SIM bay.. And Hank, would you verify that it's okay to take the optics and put them to CMC or to 0. I sure don't want to take any chances with it.  
CASPER Okay, it's okay. They say nothing will happen.  
CASPER And Ken, we've got a little trouble with the high gain. We need to go back to react.  
CASPER Okay, I'm in react. Want to go back to AUTO now?  
CASPER Stand by. Okay, clear to go to AUTO.  
CASPER Okay, AUTO it is. You got a good one that time. And if you're ready, I'm ready to start deploying things here.  
CASPER Okay, Ken, would you stand by. We're waiting for Oswo to get his data.  
CASPER Oh, very well.  
CASPER Ken, while we're waiting here. How'd your extend time go on the mapping camera?  
CASPER I didn't time it that time, Hank, I'm sorry.  
CASPER Okay. Casper, is pan camera power off?  
CASPER Okay, pan camera power is off. Mark it.  
CASPER Oswo has his data now, we can proceed with boom deployment.  
CASPER Okay, let me button this up. Okay, the first one you would like is the - how about a mass spec for 61 seconds.  
CASPER That's affirmative.  
CASPER Okay, going to deploy. Mark.  
CASPER Deploy is off at this time.  
CASPER Roger. You're clear to start the gamma ray out.  
CASPER Gamma ray is going out.  
CASPER Okay, gamma ray has stopped.  
CASPER Okay, Ken, and could you give us barber pole plus 4 on the map camera.

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CASPER Okay, that should be one more step, right?

CAPCOM That's affirmative.

CASPER Alright, you've got it. Okay, now the mass spec experiment is going to ON, the ion source is going to stand by.

CASPER Alpha particle and X-ray door is coming open. Mark. And it's good.

CASPER And the X-ray is coming to on. Mark.

CAPCOM Ken, the SIM bay looks real good right now. Like to read -

END OF TAPE

CAPCOM Ken, the standby looks good right now. I'd like read you up but -- PI26 padlock there.

CASPER Okay, would you standby just a second while I get some food going here?

CAPCOM Okay.

CAPCOM Ken, for your information, we're planning on your retirement. To rest, that is. At 109:30, the nominal time.

CASPER I'm glad you clarified that. I hope you realize I'm too young to retire.

CAPCOM Roger.

CASPER Can you tell me anything about the status of the surface guys. Are they going to be able to get at least 2 EVA's out of this?

CAPCOM I think the plan is now, Ken, for two EVA's. They are busy buttoning up the LMP now and getting ready to get some sleep. They are going to move the EVA times, at least, the first one, is going to be tomorrow morning about 10:30 central, I think.

CASPER Okay.

CAPCOM And we're going to change our shifts around too so I'll be on again in the morning and then Stu will get it in the afternoon.

CASPER Okay.

CASPER All right. Now, that I've got something soaking here, I'll be ready to copy. Okay. Go ahead.

CAPCOM All righty. TEI 26, SPS, G&N 38726 plus 072 plus 133, 125 14 2747 plus 31703 plus 11016 minus 03101, attitude, 18108 niner, 021. The rest of the pad NA the sixth star the same as on your (garble) pad, the same altitude, ullage, 2 jets 17 seconds, other, land of the moon at K minus 17 niner .02 in the pad.

CASPER Okay. That's a TEI 26, SPS G&N, 38726 plus 072 plus 133, 125 14 2747 plus 31703, plus 11016 minus 03101, 18108 niner 021. Series and (garble) where the angles are off certain pad, 2 jets, 17 seconds, lan, 17902 and that's a minus.

CAPCOM Good readback, Ken.

CAPCOM Okay, Ken, we're going to leave you alone and let you eat now. We still got about 49 minutes to LOS. And at your convinence, sometime a little later, we'd like you to get the crew status report from this morning which was omitted.

CASPER Okay. That's going to take some book-keeping. I'll work on that. Sure would rather look out the window, Hank.

CAPCOM Did anybody ever give you some words on

CAPCOM the undervote last night?

CASPER Yeah. The word we got was that IAN is vertically happy to get the pan camera on at the same time the heaters all came on and I guess the (garble) was just too much.

CAPCOM That's the story --

CASPER Is that way you understand it?

CAPCOM Right. That's affirmative.

CASPER Okay. Well, I'm sorry we missed those photos but it sure seemed like the prude thing to do at the time.

CAPCOM We concur.

CASPER Henry, another thing that turns out to be a pretty nice little gadget are these nets that are in the storage departments, particularly, when you get the food locker after it's about half full. The things are able to stay under some (garble) of the control, and that's a mighty nice thing.

CAPCOM So they have been working out real good, huh?

CASPER Yeah, it sure is. It's been a very help.

END OF TAPE

CAPCOM And Ken, you don't have to acknowledge, but our plans are in the morning first thing to give you a clock sink and get you back into the flight plan.

CASPER That sounds like a good plan.

CASPER One thing you've got to be careful of up here is when you go to look outside - you kind of have to watch it that you - you get too greedy and get your nose up against the window and about one breath is all it takes and it's all fogged over.

CAPCOM Roger, understand.

CASPER I think our humidity must be running fairly high. I'm passing over a nice little guy right now, and would guess - I haven't been paying attention to where I am, looks like I must be probably looking to the north at somewhere around the Guttenberg Uplands and I found some more - a little crater that's got another large fill in the center and a nice big crater at the top of it, and a little crater chain around it. And, as I said earlier, everything out here has this linear pattern or these linements, it doesn't matter whether it's a flat surface or horizontal, vertical, inside the wall of a crater, they all seem to have it in one form or another.

CAPCOM Okay, Ken. If our plot board up here is right, you ought to be coming up on the landing site.

CASPER Okay, let's see. Oh, maybe I'm at the wrong window here. You're right, Henry.

CASPER And if you remember that little black dot that we drew on our map and talked about. There's a little black spot about in the right area, and I don't have my map so I just looked out at it, but I'll come back next time and take a look. Sure looks like it is something that is entirely different texture.

CAPCOM Are you talking about right in the area of the landing site?

CASPER In the landing site area, but not in the landing site - in the traverse regions, but that little dark thing looked like a bossle of coal that was out to the north and to the west. There's a little black dot out there that looks like there may be something that is distinctive. And next time I come over, I'll be better prepared to look for it.

CAPCOM Okay, I remember that one, that was in the edge of the plotter wasn't it?

CASPER Yes sir.

CASPER I tell you, it sure is impressive, how much the scenery changes and the sun angle changes and how rapidly that goes down.

CASPER Does your plot board show me over Alpetragius?

CAPCOM Say, again?  
CASPER Does the plot board show me over  
Albetegnius?  
CAPCOM That's affirmative.  
CASPER Okay. Well, let me tell you a little something  
here, just to the north and mostly to the west of Albetegnius,  
the ground, and I think in the higher suns, it's going to  
look like - it's going to look a lot like Imbrium sculpture,  
but out here it has the same modeled effect and the same  
appearance that the Descartes area had at the same sun angle  
yesterday. And that's almost directly south of - well it's  
a little south and a little bit to the total mass and it's  
a little bit to the east of Alphonsus.  
CAPCOM Roger. You ought to be coming up on  
the terminator now, is that right? Pretty close to it.

END OF TAPE

CAPCOM Roger. You ought to be coming up on the terminator now, is that right? Pretty close to it.

CASPER Yes, sir. My view is disappearing rapidly.

CAPCOM You should be over Ptolemaeus now.

CAPCOM Casper, for your information, everything in the SIM bay is looking real good now.

CASPER Okay. I just saw something that -- I really don't know what to make -- I'm in the -- I think the spacecraft is probably just about in the dark, but not quite. We passed the ground terminator, and I'm looking out the window number 3 down towards the ground trying to get a preview of what's coming in earthshine and there's a bright flash that's going along out there. At first, I thought there was something that was on the deck but it's apparently a piece of debris that's in orbit with us and it's sitting there tumbling over and flashing.

CAPCOM Is it traveling along with you?

CASPER It moved across the ground, so, it must be a piece of debris. Yeah.

CASPER As a matter of fact, as I look around now, there's quite a few of those.

CAPCOM Can you get any idea how far away they are?

CASPER I don't know what effect that has on --

CASPER No, I can't Hank. You know, it's a piece of something that's out there and it's tumbling so that it gives you an uncombing reflection. Don't feel that awkward but it's moving at approximately the same velocity that we are.

CAPCOM Ken, in reference to your observations of Crater King, we got some ideas about those swirls that are northwest of King and we'd like for you to get a comparison with those with the swirls of either units and I wonder if those also have topographic expressions.

CASPER Okay. OP 2, I have to do that some other time because today I'm too far south to see those things up by the other unit. I can just barely see up to Neper.

CAPCOM Roger.

CASPER But, we sure need to keep that in mind.

CAPCOM And another thing you might be thinking about that if you get an opportunity on some REV is get us a description of the area north of the Crater King and including the Soviet Mountains.

CASPER Yeah, I was thinking of looking at that, but I really hadn't planned to spend much time on King, this time; I was just going to just kind of look at the old crater there, but I got so interested in it that it looked like

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CASPER                   there's another crater that's just to the east of King that has a little bisected central feature just like King. You know, the thing that makes that old white shape and it looks the same way. That's kind of interesting, I thought.

CAPCOM                   Yeah, I guess we haven't seen that in the photos.

END OF TAPE

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CASPER Yeah, Hank, I ought to be passing Flint (garbled) now.

CAPCOM Roger, it's looking --

CASPER It's really impressive how much you can see in the dark.

CASPER I don't believe you can see as much now as you could last night. Of course, partly we're up higher than I was when I looked at it last night. And the Earth is noticeably smaller, so I guess it's losing its reflective ability rather rapidly.

CAPCOM Roger.

CASPER I was also very impressed with the way you could see the LM's outline in Earthshine. That was something I had not anticipated. Last night as we came across, oh let me see what it was? It starts with an H, over on the western rim. Havelius.

CAPCOM Yeah.

CASPER We drove across that last night and you could really see the floor patterns in that thing beautifully.

CASPER Okay, Hank, we'll see you. I owe you a crew status report from this morning. Right?

CAPCOM Roger.

CASPER Okay, let's see if I can give you that thing now.

CASPER Okay, Alfa 1 22 0 47, Alfa 3 6, Alfa 4 negative. BRAVO 1 15 0 44. BRAVO 3 6. BRAVO 4 negative. CHARLIE 1 21 095. CHARLIE 37. CHARLIE 4 1 segunal.

CAPCOM We copy, Ken.

CASPER Okay, then we'll try to go down the menus here. We're looking for day 4, is that correct?

CAPCOM Affirmative.

CASPER Okay. On Commander. Meal A, you can delete the mixed fruit, and Meal B you can delete pea soup. Meal C delete chicken stew and add a chocolate pudding. For me you can take Meal A and delete mixed fruit.

APOLLO 16 COMMAND MODULE COMMENTARY 4/20/72 CST 22:34 GET 106:39 CM-43/2

CASPER            You can delete bread and jelly, on Bravo you can delete pea soup, meatballs. On Charlie you can delete the chicken stew, and I guess that takes care of those things. The reason for so many of these - we all deleted these canned things because we got 'em all over the spacecraft the last time, and we decided that we really couldn't afford to do that again.

CAPCOM            Roger, we copy.

CASPER            And let me find Charlie's here.

END OF TAPE

CASPER            Okay, here's Charlies. On meal A you can delete mixed fruit, and jelly, Meal B you can delete sugar cookies. Meal C you can delete the pudding and the chocolate bar.

CAPCOM            Roger, copy.

CASPER            Now we are coming across Hevelius again. And I can see Grimaldi and a couple of fractures that go across this rim and you can really see a lot of detail here. You can see the rilles. You can see as everybody pointed out these - They look like robins that are just dropped down and they go all the way across the crater like Hevelius. And looks like they go out to Procellarum and they come down to the - in fact they go all the way down to Grimaldi, they run into a crater, and it looks like they might have been filled a little bit. In fact it looks the same way that some of the rilles that are south of Fra Mauro look like they've been filled in. And there is a very smooth little patch that's lined up with the (garbled) that runs from there to Grimaldi. Now I'm sorry. I'm calling the Riccioli, Grimaldi. The crater I'm talking about now is Riccioli, and it's got quite a few fractures that run out. And it looks like a flow pattern. It looks just like looking down on a long tongue of lava like we've seen terrestrially I don't mean to infer that it is lava, but I'm just saying it has the same appearance. And it is coming out of the northeastern corner of Riccioli and it has what looks like a little ripple patterns on it like you would expect from flow bands, but they aren't quite as accurate and they don't take quite the same consecutive pattern that you'd expect from a full front. But this little crater coming down from Hevelius, the rille that comes down through there, it's a crater, then it gets a very, very smooth spot and then it runs in and you can see continuations of these lineaments right on the cross Riccioli.

CAPCOM            Roger. That sounds real interesting.

CASPER Riccioli has quite a few elongate little craters around it. Several of them are elongate and one of them is quite long. I'd say it's maybe - it's curved and looks like it's maybe 10 kilometers long, and they have just a slight arc to it, but it is a very elongate feature. Now we are moving into material that's very hilly and I don't see a lot of small craters. I don't see a lot of bright ones. You can see bright rims in here quite well. Some things that do stand out to the west of Riccioli are the very dramatic cross cutting grabben type rilles. They cross in one place here almost 90 degrees to each other. Looks like I'm looking at a very subdued old basin and these things go across the hills and right on across the basin floor. And, I'm not sure, but I would guess that some of these other lineaments that I'm seeing, they're running towards the north east or more than likely things coming out of Orientale. I should be coming in towards the outer rim of the Orientale basin. Hey, you get the same kind of impression at the terminator when the Earth shine runs out as you do when sunshine runs out. The only thing that's different is you don't get to see quite as much as - everything is a lot more subdued. And you don't get shadows that are nearly as long, or at least not as bright. There is also running down here, there is one ridge and I'm sure I'm looking at a ridge, instead of a grabben. I've got grabbens that cut it. But this thing has a bright line on it that looks like a ridge that runs northeast southwest along with some of the grabbens. And then seems - it's one of the first big ridges I've seen that cuts up over a highlands clump of material. That's all just to the west of Riccioli.

CAPCOM Roger, copy.

CAPCOM Ken, we have your --

CASPER Getting ready to --

CAPCOM Ken, we've got your flight plan here.

CASPER Oh, yeah, we're ready for LOS. Okay, do you have time to read it to me?

CAPCOM I think so, if you are ready to copy.

CASPER Alright, can you tell me where I should start.

CAPCOM Okay, LOS will be at 107 02.

CASPER Okay, should I writing in the flight plan or should I be writing in something separate?

CAPCOM I think you better write it in something separate.

CASPER Okay, standby.

CASPER Okay, shoot.

CAPCOM Okay, 107 02 LOS. And approximately 107 10, at approximately 8 minutes after LOS configure DSC, stop/high bit rate/command reset/forward 107 21 sunrise, 107 25 02 heaters 1 and 2 auto, 02 heaters 3 OFF. 107 38 image motion increase barber pole plus 3. 107 48 AOS. 107 57 pan camera standby stereo power. 107 58 13 this is your T start pan camera operate. Mass spectrometer ion source ON. At the same time right after you get the pan camera. 108 04 image motion increase barber pole plus 4. T stop' 108 28 13 that's all T stop for the mapping camera which I read up to you earlier. It's pan camera standby at T stop. Pan camera OFF. MSFN Q. Mapping camera OFF (T stop) wait 30 seconds. Mapping camera standby. Image motion OFF. Laser altimeter OFF. Mapping camera retract. Mapping camera laser altimeter cover closed. 108 40 mass spec deploy gamma ray deploy. 108 50 return to the flight plan at last and pick up with a P20 and follow on with those activities through your presleep checklist and the only thing different there is I've already given you TEI 26 pad.

CASPER Outstanding, you guys really do good work. Okay, I think I've got everything here. I didn't have any questions about it. Do you want me - how much time do we have? I don't know if it's worth reading back or not.

APOLLO 16 COMMAND MODULE COMMENTARY 4/20/72 CST 22:44 GET 106:49 CM-44/4

CAPCOM            Okay, we got 2 minutes to LOS. You don't have to read back. I think --

CASPER            Okay, here it comes. 107 02 LOS. 107 10 configure DSC stop high bit rate, command, reset and forward. 21 is sunrise. 25 02 heaters 1 and 2 to auto. 02 heaters tank 3 OFF. 38 IMC increase barber pole plus 3. 48 AOS 57 pan, standby stereo and power. 58 13 pan camera to operate. mass spec ion source ON. 04 that's 103 04 IMC to barber pole plus 4. 28 13 T stop for pan camera, standby mapping camera to OFF. 30 seconds. Then to standby IMC OFF. Laser altimeter OFF. Mapping camera retract. Mapping camera cover closed. At 108 40 mass spec gamma ray to deploy. 108 50 return to the flight plan.

CAPCOM            Good readback, Ken.

CASPER            Okay. Outstanding.

CAPCOM            Okay, we got less than a minute to go. Stu will see you on the other side.

CASPER            Alright, Hank, thank you very much. You've done a good days work. See you tomorrow.

CAPCOM            Rogo.

END OF TAPE

CASPER Houston, are you there?

CAPCOM Yeah, Roger, Casper. Standingby.

CASPER Hello there.

CAPCOM And Casper we'd like you to go back to reac on the high gain, please.

CASPER Okay, every time I try that it looks like it does worse. Now, let's hold it in there this time, I guess.

CAPCOM And, Ken, sometime at your convenience, we'd like to have you push on your biomed sensors, hitting a little noise on the data, get my page all cleared up.

CASPER Okay, I'll get to that in just a minute. I'm flapping right now with some - trying to make up the things we missed here. And I just finished putting the post of (garbled) and Megelhaens on magazine November, November and I'll try to pick up the one on (garbled) if you'll tell me I can do it on November, November.

CAPCOM Okay, standby.

CAPCOM And Casper, could you give us a frame number on November November?

CASPER Okay, how about oh, 145.

CAPCOM Okay, 145. I'll believe that.

CASPER And don't let me forget things like this pan camera thing coming up, cause I'm setting here getting camera set up. I'm going to try to get the Earthshine sequence in this trip too.

CAPCOM Okay, Rog. We'll give you a call.

CAPCOM And Ken, for the time now - time from the next 15 seconds

END OF TAPE

CAPCOM And, Ken, after the time now - within the next 15 seconds or so, if you want to get the pan camera standby stereo in Power.

CASPER Okay. Thank you, sir. Standby Stereo in Power. You've got it.

CAPCOM Roger.

CASPER Man, I tell you. Just a little reminder like that can go a long ways toward getting something done in here.

CAPCOM Jolly good. We'll try to please.

CAPCOM Okay, Ken, you're 30 seconds from the P start time on the pan camera.

CASPER Okay.

CAPCOM Ten seconds, Ken.

CASPER And you've got it.

CAPCOM Okay. Rog.

CASPER Barberpole went grey, and away she goes.

CAPCOM Very good; and ion source On.

CASPER Ion source on, Mark.

CAPCOM Okay, and Ken, on November November, we'll give you 30 frames on that one.

CASPER Okay. I guess I was scheduled for another Magazine, but I just don't have time to change it.

CAPCOM No sweat. You've got 30.

CASPER Okay. That should be plenty. And I got Magazine XX loaded in the Nikon, and I'm ready to go to work on that as soon as we get in the darkness. Well, maybe that won't work, because I guess you've got a P52 and things coming for me.

CAPCOM Uh - Stand by on that, Ken.

CAPCOM Okay, Ken, what we'd like for you to do after this Sunside pass, after you finish up here, is to get a good night's sleep. We're not showing you anything scheduled after that.

CASPER Okay. I thought there was a P52 or something I was supposed to get as soon as it got dark. I'll - I can sneak that in there, too. I hate to see us miss very much of the things that we almost did.

CAPCOM No, Ken. It's not scheduled. The last thing you need to do is 108 plus 50, where you go into the activities there in the Flight Plan. You go right into your Presleep Checklist and we'll see you in the morning.

CASPER Oh, okay. Outstanding. Very good. Thank you.

CAPCOM Rog.

CAPCOM Okay, Casper, if we can have the High Gain  
to Auto, please.

CASPER You've got it.

CAPCOM Okay.

CASPER Can you look on your plot board and tell me  
approximately what my longitude is right now?

CAPCOM Oh, Ken, it's probably about 70 East, or  
something like that.

CAPCOM You're just coming across the western rim  
of Smythii, there.

CASPER Okay. Good enough.

CASPER Yeah, here comes our old friend, Langrenus.

CAPCOM Okay, Ken. We need Barberpole plus 4.

CASPER Need a little Barberpole, don't you? Okay,  
that should be 1 plus what we have.

CASPER Hey, Stu, if I put 30 frames on this  
Crosier, I won't get that first strip of Kant and Andel. Do  
you think about -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-21-72 GET 108:07 CST 00:02 CM-47/1

ORION Hello Houston, ORION over.

CAPCOM ORION Houston, go ahead.

ORION (garble) we had another (garble)

(Garble) 10 to 15 percent quantity is that what you got for (garble)

CAPCOM That's affirmative.

ORION Okay, if you're happy, we'll see you in a couple of hours and we'll go back to sleep.

CAPCOM Say again Charlie, you're very garbled.

ORION I say if you guys are happy, we'll go back to sleep.

CAPCOM Charlie we got one circuit breaker we want you to open. Standby a minute. The rendezvous radar operate, to panel 11, row 3. Under heaters.

ORION Okay, we got it. Stand by.

CAPCOM Roger. Thank you.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-21-72 GET 117:54 CST 09:48 CM-48/1

CASPER (garble)  
CAPCOM You're too weak to you there. Standby one.  
CAPCOM Good morning CASPER. Up and at em.

END OF TAPE

CASPER Hello Houston, are you there this morning?  
CAPCOM Good Morning CASPER, how're you feeling  
this morning?  
CASPER Swinging.  
CAPCOM You get a good nights rest?  
CASPER Sure did. That's the best sleep I've had  
since I've been in there.  
CAPCOM Hey, that sounds great. Whenever you're  
ready to get a few things done before you're eat period, let  
me know.  
CASPER Okay, if you got some things for me to copy,  
I'll get started on that and we can catch up on the crew status  
when we get a chance.  
CAPCOM Okay, before we get started Ken, could you  
terminate the batt A charge.  
CASPER No sooner said than done.  
CAPCOM Okay, Ken. How about let's starting with  
the flight plan changes for a couple of REV's here, and get that  
out of the way.  
CASPER Okay, just a second. Let me check the test  
meter.  
CASPER Okay, the battery compartment is sitting right  
at 1.5 volts, so I guess the next time we go to do a dump of stuff,  
it wouldn't hurt to amend that too.  
CAPCOM Roger, copy.  
CASPER Okay, let's go.  
CAPCOM Okay. The first item is right here at the  
wakeup 118 hours. We've already terminated the batt charge. We  
want to get a - we don't need to write all this in, I'll just tell  
you what we want to get from you is a thin status report which we  
didn't pick up last night, and a little bit later here, we want  
to uplength the lift off time. The first item really comes at  
118:15 and there we want to put sync-mission timer to CMC clock.  
And that's a VERB 5 NOUN 1 enter 1706 enter. And then PSM verification  
by MSFN copy on MSFN Q. I guess your farmiliar with that procedure  
aren't you.  
CASPER Yes, sir.  
CAPCOM Okay, and they've got a note here where we  
copy out 3 registers, at the proper time. Okay, the next item  
is 118:55 delete the charge battery B.  
CASPER Okay. Battery B charge is deleted.  
CAPCOM Okay, at - Stand by a minute, Ken. Okay, Ken.  
That should get you through the next couple of REV's. We're just  
going to follow the flight plan. How about now, let's set up  
our CRYO configuration. We would like to verify the, that we're  
using the 100 watt heaters on 02. That's on panel 226, I believe.  
CASPER Okay, that's verified.

CAPCOM                   Okay, and back on panel 2, we want 02 heaters  
1 and 2 auto, and 3 off.  
CASPER                   That's verified.  
CAPCOM                   H2 heaters 1 and 2 off.  
CASPER                   Okay, H2 heaters 1 and 2 off.  
CAPCOM                   Roger, and H2 fans 1 and 2 off, and 3 auto.  
CASPER                   Okay. Fans in tank 3 are auto.  
CAPCOM                   Okay, Ken. We've got a message that says,  
do not vent the battery compartments.  
CASPER                   Okay. I won't do that.  
CAPCOM                   Okay, the next item. We're wondering if you've  
got the screens on the suit hoses. Those screens are normally  
stowed in the PGA bags during launch and we don't know if you  
ever got those on or not. If you didn't, you can put those on  
and get increased circulation in the cockpit there.  
CASPER                   Okay. No we sure didn't. I plugged up the  
inlet side so they wouldn't get dirt in them, and then he  
put the screens on. I'll do that.  
CAPCOM                   Okay, just make a note to yourself there to  
get that done.  
CAPCOM                   Okay, tell you a little bit about the SIM bay  
status here. Mapping camera is working fine. No anomalies. The  
only problem we had was that retrack, and our plan on that is,  
that we're going to leave the mapping camera out, except when we're  
doing coupled RCS. The laser altimeter has fired 663 times, since  
launch but it's starting to miss now about 20 percent of the time  
on the altitudes. Pan cameras working fine, no anomalies. We've  
got a margin of 58 frames. Forgot to give you the margin on the  
mapping camera. We're 452 frames ahead there. Masspect is per-  
forming good, and the extent retrack performance is good except that  
the movement hanging up near full retraction, you'r aware of that.  
However the boom has been verified safe for STS burn. The gamma  
ray is getting good data. The gang is stable and it's excellent  
resolution. Boom performance in nominal. X-ray and Alpha particles  
are both good.  
CASPER                   Okay. Anybody seen anything unusual on any  
of their data yet.  
CAPCOM                   That's negative, Ken. And if you'll give us  
ACCEPT, we'll get on with you state vector update.  
CAPCOM                   Stand by for clock update.  
CASPER                   You've got it.  
CAPCOM                   At -

END OF TAPE

CAPCOM And for your information, on plans, we're not going to reschedule any extra mapping camera or pan camera passes today to make up for what we missed yesterday, we're just going to go with the flight plan.

CASPER Okay.

CAPCOM And in regard to the booms, we're going to do, follow the nominal extension and retraction for the mass spec except we're going to try to get the retractions done during AOS so we can watch it.

CASPER Okay, that sounds good and was the mapping camera retract time really as involved as I thought it was?

CAPCOM Stand by.

CAPCOM That's affirmative, Ken, they got 315 on their data down here.

CASPER Okay.

CAPCOM And in regard to your EKG, sometime when you get a chance here, we want you to service the leads there we want you to - want you to doff your harness, replace the sponges and tape and don it again.

CASPER Okay, that's about a 20 minute job.

CAPCOM Just whenever you can work it in, no real rush there.

CASPER I'll do it when I get a chance.

CAPCOM And Ken, confirm that the status looks just about like it was when you went to bed last night, nothing to report there, and I guess you can go ahead and start on your postsleep checklist and we'll be standing by for your crew status report and SIM status report.

CASPER Okay, I'll have that for you in just a minute.

CASPER Okay, Hank, I'm ready for a little crew status update and, let's see, you want me to take the mass spec ion source stand by now?

CAPCOM Roger, Ken. Go ahead.

CASPER Okay, it's - in standby, I'll get the pan camera mode is in standby, and the power is coming on. Mark. Barber pole, back to gray.

CAPCOM Okay.

CASPER Are you ready for a little crew status?

CAPCOM Roger. Go ahead.

CASPER Okay, bravo 115048, bravo 3, 6-1/2, the best yet, bravo 4 none, on the menu side, the happy gourmet says that a Meal A for CMP was a large orange juice with potassium, Meal B was - and then breakfast - a chocolate bar, sugar cookies and another citrus beverage with potassium. Meal C - Chicken and rice, 2 orange drinks, fruit cocktail, pineapple fruit cake. I got - I guess yesterday morning -

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 9:58 GET 118:09 CM-50/2

CASPER            For the Commander, you can delete the  
peaches, you can delete the grits. On the LMP - you can  
delete the peaches, you can delete the eggs and you can  
add an extra orange pineapple with potassium.

CAPCOM            Okay, Ken. We got all that.

END OF TAPE

CAPCOM Casper, Houston you are clear for a pan  
camera power off. The lens is stuck.  
CASPER Okay, I'll get that in just a second.  
CASPER And camera power is off.  
CAPCOM Okay.  
CAPCOM Ken we're uplinking a state vector to you  
now.  
CASPER Okay.  
CAPCOM Casper, Houston the computer is yours.  
CASPER Okay, thank you sir.  
CAPCOM Casper, Houston whenever you get a chance  
we can take the gamma ray shield off and the mass spec landing  
source on.  
CASPER Mass spec landing source is on. The  
gamma ray shield is off. Shield is off.  
CAPCOM Roger.  
CAPCOM Ken no need to acknowledge, but give us a  
call when you get ready to sync your mission timer.  
CASPER Okay, I'm trying to catch this photograph  
of updating and I'm almost over it now.

END OF TAPE

CASPER Okay, I'm trying to catch this photograph of updating and I'm almost over it now. Well, it looks to me like I'm not going to be able to get it because the terminator isn't quite far enough over this time. I guess we're far enough off of our basic here.

CAPCOM Okay, you say Daley hasn't moved out into the line yet?

CASPER No, the terminator is lying just the west of the pola meas. I can see the highlands and I think I see probably the first crater chain, first of the craters in the chain and in fact that may be Davy G. The rest of it is still with Ditto.

CAPCOM Roger.

CASPER I guess I'll have to let that one go today. Okay, now let's get back to where you were. Yeah, what's happening here Hank, it looks like we're a little bit early, but it still looks like those times would have been - those times probably weren't going to quite hack it anyhow.

CAPCOM I'm a little bit puzzled about it too Ken, that should have been good.

CASPER Okay, and I'm ready. Okay, let's see - we need to catch up on a TSM is that right?

CAPCOM That's affirmative.

CASPER Okay, that's what I show on 1706.

CAPCOM Okay, Ken we've got the numbers - it looks good.

CASPER Okay, and I've copied them down. Now we can sync the mission timers to that, huh?

CAPCOM That's affirmative.

CAPCOM Ken, in regard to that data I was just talking to Spence and he says that the - that that was the correct time and that what they call officially is the terminator, and the photo sending should have worked. It sounded like, from what you said, may have been a little too dark.

CASPER There is nothing but hard shadows down there where where Davy is, maybe the rim of Tolanaus there and GARBLE in that area is a little higher than we calculated because we wouldn't have to be off by much in order to keep you from missing it. After we talked about it there I looked up the side to the south and it looked like further south in the mare. The terminator did go out a little further so I think it got caught by elevation.

CAPCOM I suspect that's the case, Ken.

CASPER Okay, I'll whip in a little P52 here.

CASPER Hey, Hank. Now there's the old earth again and it's getting smaller. I think it's not sanforized.

CAPCOM Roger.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST10:18 GET118:24 CM52/2

CAPCOM Ken, in your post sleep did you terminate the jet monitor?

CASPER Oh, hey no. Let me write that on to my post-sleep checklist right now. I wrote that in as an extra item yesterday and forgot it this morning.

CASPER It sure pays, to have you guys watch it.

CAPCOM Well, I just happened to think of that one and I got to thinking about your P52 using SCS and I then I wondered about the jet monitor program.

END OF TAPE

CASPER It sure does pay to have you guys watching.  
CAPCOM Well, I just happened to think of that one,  
and I got to thinking about your P52 use an SCS and then I  
wondered about the jet marga program.

CASPER For that one, you get the award for the  
year. That was from --

CAPCOM And, Ken, whenever you get a chance get  
the gamma ray shield on when you get through with this.

CASPER Okay. The gamma ray shield is coming on,  
mark it.

CAPCOM Okay, Ken, we got the 93 at 10 o'clock.

CASPER Okay, I'm going to count the angles.

CASPER Okay, I'll do it a 10.

CAPCOM And, Casper, Houston. Kind of looks like --  
to you there for that deadband test. We'd like to change the  
5 degrees to 2 and a half degrees.

CASPER Okay. Make that 2 and a half.

CAPCOM And Ken, since we updated the clock, we  
need to update the time on the pick for the TEI 26. The rest  
of the TEI 26 pass good. So, whenever you're ready to copy,  
I'll read you a new TEG.

CASPER Okay, just a second. Let me get my GDC  
here.

CASPER The GDC is working a lot better. When we  
started out, I made a brief check on it. You know, right  
after insertion and it was, Houston, pretty readily, and now  
this thing will go for 6 hours and be off less than 10 degrees.  
I guess maybe it just -- once it got warmed up, it just sort  
of stabilized and it's really -- really doing a good job now.

CAPCOM Hey, that sounds real great.

CASPER Yes, particularly if you're passing it on.

CASPER Okay, why don't you give me a new time for  
TEI-26?

CAPCOM Roger. Tick is 125 26 15.47.

CASPER Okay, that's 25 26 1547.

CAPCOM Roger. That's 125.

CASPER Yeah, yeah. 125.

CASPER Thank you.

CASPER Then I've got the purge line heaters on.

CAPCOM Roger, copy.

CASPER And about now, suppose I give you -- try  
to give you a rundown on the film.

CAPCOM Okay, go ahead, Casp.

CASPER Just use any of the -- we didn't use  
any of the UV film yesterday, that's magazine Oscar Oscar.  
Magazine Sierra Sierra reads 20 frames.

END OF TAPE

CASPER And I got the purge lines heaters on.  
CAPCOM Roger, copy.  
CASPER And about now, suppose I give you -  
try to give you a rundown on the film?  
CAPCOM Okay, go ahead, Ken  
CASPER We didn't use any of the UV film yesterday, that's magazine Oscar Oscar, magazine Sierra Sierra reads about 20 frames. I'm just going to have to go through the film locker here and pull out mags and tell you what's on them. Okay, November November is completed. And Victor, we're only up to 8. On the 35 millimeter I used the - well we didn't finish up that CIM role when the ALFMED was on. It's the same status as half band, but I had to take it out in order to get X-Ray X-ray put in. The Earthshine, which we didn't get last night, and if we're going to get it, we ought to get it right soon cause that earth is getting considerably smaller. The - I had to take that CIM mag out, unfortunately. And I'm going through the 16 TIU's, portions of 2 of them, one the undocking sequences and one of the landmark tracking. Okay, on magazine Charlie Charlie, I'm showing 60 percent - that's 60. And on magazine Bravo Bravo, I have 80 percent. I think that should be all the film, Hank.  
CAPCOM Okay, we got it, Ken.  
CAPCOM And Ken, I've got one more flight plan update for you.  
CASPER Okay. Go ahead.  
CAPCOM Stand by one minute.  
CAPCOM Ken, I'll read this change up to you next time. About what it amounts to is that we're going to delete the bistatic radar and its place we're going to put an oblique photo pass, and I'll catch you on the next rev with it. We've got about 4-1/2 minutes to LOS.  
CASPER Okay.  
CAPCOM Casper, Houston. We lost comm there for a little while. We're about 3 minutes from LOS and everythings looking good. Have a good breakfast and we'll see you on the next rev.  
CAPCOM Casper, Houston.  
CASPER Go ahead.  
CAPCOM Roger. We show your manual attitude in excell command.  
CASPER Well, thank you. I wonder how that one happened. It's pretty easy to kick a switch when you're rolling around in here. You chase a piece of the flight plan away from you or you kick a camera and that's not an unusual thing to happen, I appreciate your telling me about it.  
CAPCOM Roger.

END OF TAPE

CASPER Hello down there.  
CAPCOM Hello Casper.  
CASPER They're still here.  
CAPCOM Roger. How'd everything go.  
CASPER Sure do feel a lot better. Got quite a  
bit numb on that little back side fixing there.  
CAPCOM Hey, that sounds great. First thing off  
the bat here Ken, we'd like to get a bat B charge going.  
CASPER Okay. Stand by. Okay, you've got it.  
CAPCOM Roger.  
CAPCOM And for your info Ken the E mod we got  
last night looks good.  
CASPER Okay. Thank you.  
CAPCOM And Ken I got a few items for you when you're  
ready to work them in. I got a mapping camera photo pad, a  
flight plan update and update to your rational loads in the  
G&C checklist whenever you can get a break from eating there.  
CASPER Okay. I'm just getting a good start on  
that and I'll copy those as we go along here. Give me a  
couple of minutes to get some things going.  
CASPER Okay, Hank. I'm ready to copy.  
CAPCOM Okay. We'll start with the flight plan  
changes and the first one's at 123:26.  
CASPER Okay.  
CASPER And, incidentally, Ken, have you got the  
urine dump charges on the last back side.  
CASPER That's affirmative.  
CAPCOM Okay. At 123:26, we're going to delete  
the maneuver to biostatic radar attitude, we're going to  
delete the biostatic as we told you earlier. Top of the next  
column there about 123:32, delete all that before you can  
configure the S-band, following that delete the - - or VHF  
following that, delete the S-band, delete the P20 following  
that. Infact, delete everything in that column. And delete  
the biostatic radar over to the right hand side of the bottom.  
CASPER Okay.  
CAPCOM Okay. Now back at 123:26, we want to add  
in there this 40 degrees South of Leake. A P20 Option 5 40 degree  
South - -

END OF TAPE

CAPCOM Thing in that column. And release the biostatic radar over to the right hand side of the box.

CASPER Okay.

CAPCOM Okay, now back at 123:26 we want to add in there this 40 degree south oblique P20 option 5. 40 degree south of oblique. Photo attitude (123:31) the NOUN 78 is plus 270 00 plus 087 75, plus 180 00. NOUN 79, plus 000 50 attitude 182 000 underlined slash 080, 000. Set high gain, pitch 10 yaw 350 for AOS acquisition.

CASPER Okay Hank, I copy 40 degrees south of like. You're replacing the biostatic radar. P20 option 5 at 123:31, NOUN 78 plus 270 plus 87.75 plus 180. NOUN 79 is .50. Give me an attitude of 182 080 and 000 and pitch 10 and yaw 350 for acquisition.

CAPCOM That's good readback and on the next page, you can delete the biostatic radars in both columns and at 124 take it back, let's go back to the previous page. Lost something there 123 31. We want to add at 123 31.

CASPER Okay.

CAPCOM Image motion on. Mapping camera on T start. And image motion barber pole plus 3 and then on.

CASPER Okay, you have the T start time?

CAPCOM We'll get that up to you in a Pad. That's still a long ways away.

CASPER Okay.

CAPCOM Then over at 124 32 we want mapping camera off at T stop.

CASPER What -- wait a minute, say the time again.

CAPCOM 124 32. On the next page.

CASPER Okay. I got it.

CAPCOM Mapping camera off. T stop, wait 30 seconds, mapping camera to standby. And image motion off.

CASPER Okay.

CAPCOM And could you give us auto on high gain?

CASPER You've got it.

CAPCOM Okay and the last change is at 125 06, the following page. Delete the P52. By 125 06 there.

CASPER Got it. That sure is a super little platform isn't it?

CAPCOM Boy it's a beauty. Okay, I have a mapping camera photo pad. This pad goes at 121 35 approximately.

CASPER Okay.

CAPCOM Okay T start is 121 32 18, T stop 122 32 08.

CASPER Okay 121 32 18, 122 32 08.

CAPCOM And the last item I have for you is a change to your erasable load from the DMC --

CASPER Just a second Hank, let me write those down. Okay, I got a pad for the erasables. Alright let me find that.

CASPER I just wanted to write T stop times down before I got away from it.

CAPCOM Okay this is in your G&C checklist on page 9-4.

CASPER Okay, I'm going after it. I've got it.

CAPCOM Alrighty, in column A OID 05, change 03773 to read 03521.

CASPER I missed that Hank.

CAPCOM Okay.

CASPER I guess I'm going to have to do one thing and the other. I can't talk and eat at the same time.

CAPCOM Okay, whenever you're ready we'll -- if you don't want to do it now, just holler.

CASPER Okay, let me finish this eat period.

CAPCOM Okay.

CASPER I got -- I got carried away with trying to get ahead. Hey Hank if you got time while I can listen and -- how about telling me if there's -- if you got any words on the general EVA plan for the surface and guys are doing.

CAPCOM Okay, the guys are outside now on the surface, they got the Rover deployed and they're checking it out and they're going to try to do the nominal number 1 EVA plan. It's not as far as we can predict in the future right now is through doing the 2nd EVA tomorrow. We don't know how consumables are going to hold out for the -- for this thing. We're going to have to take a look at it whether there's a possibility of a 3rd one or not. Right now, I'm not so sure.

CASPER There still is some chance. Huh?

CAPCOM Well it doesn't look too bright but they're looking at it.

CASPER Have they got the ALSEP out yet or is -- does that come after the Rover?

CAPCOM That comes after the Rover.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 11:51 GET 120:09 CM-57/1

CAPCOM Casper, Houston. This is a reminder.  
About time for us to open the Alpha Particle X-Ray cover.

CASPER Okay. I'll - Thank you, sir. Alpha  
cover Open to Mark, and it's grey.

END OF TAPE

CASPER Okay, Hank, I'm ready to copy your original updates.  
CAPCOM Say again, Casper.  
CASPER I'm ready to copy the originals.  
CAPCOM Okay, in column A there, column Alpha, OID 05.  
CASPER This is on 9-4.  
CAPCOM That's affirmative.  
CASPER Okay.  
CAPCOM The old data should read 03 773, the new data there should 035 21.  
CASPER 03521.  
CAPCOM That's affirmative. Column A again OID07 reads now 76747, new data 76274.  
CASPER Okay, now reads 76274.  
CAPCOM Roger. Column Bravo OID04 now reads 13353, new data 13347.  
CASPER B13347.  
CAPCOM Column Bravo OID 05 old data 00041, new data 65620.  
CASPER Okay, new data 65620. That's column Bravo 05.  
CAPCOM That's correct Ken, and that's all of that. I hate to go back but along about 12506 when we deleted that P52, we should have deleted the 2 that went right ahead of it.  
CASPER Okay, let me come back to that in just a second. I'm passing over Moutler now and if you remember we talked about that funny bright ray pattern, how it seemed to have a funny shape that it took off in one direction and then it made a straight line in the other. Well there's a textural difference in the ground that's underneath that bright material. It's a - it looks like it's a - it's more like highlands kind of overlay that's on top of regular mare material, and it does, in fact, go along those - that line of demarcation that we see that seems to overlay the the - the mare type and it's - it doesn't go very far to the south and it doesn't go very far to the west. It's right along that line where you see it and then there's a little rakal, a little cluster of craters and ridges that goes along with the line that goes between Moutler and that bright ray crater with an excluded zone to the south of him, or actually southeast. I just remembered that question but I just wanted to pop that in. There's also a crater directly south of Theophilus that has a dark halo around it and maybe we'll get a better look at it later. He's about one crater diameter south of Theophilus and it's about the size of a little crater in the northern end of Theophilus.

CASPER And when I say dark, it's really just sort of a little darker brown than the rest of the material. And it's in the middle of an area that's kinda wrinkled. There's another little crater just to the north and east of that that has 3 - a cluster of 3 craters around the in northern rim and he too has a dark halo and his dark halo is about 1-1/2 crater diameters and the larger one to the south is about 1-1/2 crater diameters. Okay, let's go back in - you said something about working on the P52 and I deleted that and I should have deleted the P00 that went with it.

CAPCOM That's affirm. We didn't catch that until after we called it up. It's the 12506 there, we deleted the P52 and we should also delete the P00, just keep the place marked yes.

CASPER Okay, that's deleted. Alright, and I'm going to try to a get ahack on the landing site as we come across it.

CAPCOM Roger and -

CASPER Were you able to copy reasonably of  
VOX.

CAPCOM Yes sir, maybe 5 by 5.

CASPER Okay. I wasn't sure how much it might be clipping on ya. I've got the camera ready for our pictures of Alphonsus and it appears to me I ought to be able to catch Alphonsus and the Davy Crater Chain at the same time. The ought to both be in the Sun this time.

CAPCOM Hey, that's real good, Ken.

CASPER Okay, we're steaming along here and I just passed Kant and I tell you, these things aren't nearly as dramatic as they were down in that little pass. When you came over the Kant Platole down low it really looked like the ground was coming up and I'm crossing the Crater Descarte and that bright area and again the surface of that bright area doesn't look nearly as distinct as it did in the low sun. I have the landing site in the binoculars now. I can look down in a South Ray and it really is a jumbled thing. I can see one bright layer, then a dark layer, then a bright layer, and a dark layer on the south - or on the west side and on the south it looks like some of the same and I can't see the shadows very well to the north. I'm looking over at the - now let's see here - I'm over around the - I've got Double Spot in my binoculars and let me see if I can see anything in that area.

CAPCOM Can you see the LM?

CASPER Well, I was hoping I could say yes, but I don't think I do. Let us go back here and - it looks there is one little ridge line that goes around the - I mean that first crater that they come up to - it's Flagg or

APOLLO 16, COMMAND MODULE, 4-21-72, CST 12:01 GET 120:19 CM-58/3

CASPER Spook, I'm upside down and I'm thinking that way too. I've got the single craters and those terraces that we talked about that were over in Stone Mountain don't stand out very well from here. Looks to me like you got a lot of the same lineations that we've seen in the other places, looks like some slumping further around than where they are going to be going up. I don't think they'll be able to recognize terraces as such.

CAPCOM Roger.

CASPER The - the north west - I mean northeast correction side of that extension of Stone Mountain has a - what I would have called slumping in it were on the inside of the crater.

END OF TAPE

CAPCOM            Okay, Ken, you've got about a couple of minutes to go before the terminator photos.

CASPER            Okay, I'm getting set up now. Trying to get myself oriented to the best window. I'll tell you, I know it's not supposed to make any difference if you're going backwards or not, but it sure does.

CAPCOM            Roger.

CASPER            Okay. There's Albategnius, and he's got a nice scaly floor and a whole bunch of the - like a concentric ring, but I can't - Yeah, by golly, there's a concentric ring in that thing just like there is in the Mares. And, it goes most of the way around. In some places, it's overlain with the - like the Crater Kline hides it.

CASPER            Okay. The floor of Alphonsus is still quite shadowed.

CAPCOM            Okay, Ken. And we're coming up on the (garble). We may lose comm for a second.

CASPER            Okay.

CASPER            Hank, are you still there?

CAPCOM            That's affirmative.

CASPER            Okay. Looking at Alphonsus, I'd say that there's a - You can see this obvious little band that we talked about that runs north and south through there, and that's an entirely different texture than what you see in the material on either side of it. But it is the same on either side. Looking from north to south, I don't see anything that I can really call a good - that says there's any topographic relief going from south to north. There's no demarkation that's evident that's different at all. Although there is some of this material that's in the south that runs towards the crater's center that does indeed look like it might be tapering down and thinning out. I'll come back to that in just a minute. Let me pick up Davy.

CASPER            Well, I tell you, we aren't going to get Davy on this pass either.

CAPCOM            Still in the shadows?

CASPER            Sure is. You can just see the shadows run - oh, gosh, I'd say a quarter of a crater diameter the size of Timaeus out. And it goes to just about where Davy G is obvious. I think I've got Davy G, but that's not - it's not obvious that I can. And the rest of it just disappears. Even the central peak in Alpetragius doesn't show.

CAPCOM            I wouldn't have expected that one.

CASPER            No. No, neither would I. Well, another day.

CASPER            And, Henry, the frame number on magazine SS is now 25.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 12:11 GET 120:29 CM-59/2

CAPCOM  
CASPER

Roger. Copy 25.  
Okay, I get a canister change.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 1221 GET 120:39 CM-60/1

CAPCOM Casper, Houston. The note in your flight  
plan about not starting at 121:05 is still good.

CASPER Okay, Henry. Thank you sir.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 12:31 GET 120:49 CM-61/1

CAPCOM Casper, Houston. Forgot to ask you, did you see anything on that last back side pass that's worthy of any comment at all?

CASPER No sir, I did not. I ... let me get my head out of the cockpit.

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 12:31 GET 120:59 CM-62/1

CAPCOM Casper, Houston. We're about 2 minutes from LOS and everything's looking good. If you don't have anything else, we'll see you on the other side.

CASPER Okay, Hank, and I'm all set up to take the Gum Nebula and I've checked the star patterns and they all work out just fine, so I'll see you at AOS.

CAPCOM Good show.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 GST 13:31 GET 121:49 CM-63/1

CAPCOM Casper, lets have WIDE on high gain.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 13:40 GET 121:58 CM-64/1

CAPCOM Casper, Houston. Bring up the high gain according to the flight plan.

CAPCOM Casper, Houston.

CASPER Hello, there.

CAPCOM Oh, how's things going?

CASPER I been trying, Hank. I ... know that acquisition wasn't as smooth as I had thought it might be ... I tried to get you to use a manual to tweak it up a little bit and that didn't seem to help much, maybe I'm not helping at all, maybe I'm hurting. I saw one thing that was ... it was new about the zodiacal light world, they don't realize that, that stuff is actually reasonably bright. But you get yourself well dark adapted, then you sit out there long enough to recognize it. But almost immediately after, oh, I'd say within .. certainly within 5 minutes ...

END OF TAPE

CASPER Oh, I'd say within - - certainly within 5 minutes and maybe a little sooner after LOS. There was enough zodiacal layer solar corona whichever is the proper technical name that you could see a distinct horizon and it got just more distinct there right up till sunrise. Never did see any providence or anything like that, thought maybe we would but I guess those are too small a scale. But just prior to sunrise you see a lot of long streaks and that's - - when I say just prior that's like just a few seconds before sunrise. All of a sudden you get these very prominent rays coming out and then the sun's right there. You don't want to be looking at that.

CAPCOM Roger. Copy.

CASPER It is right pretty to watch that stuff at night.

CAPCOM Sounds like a real pretty sight. INCO says that they find you in narrow when you're trying to bring the high gain up and it's - - you'll have a little better luck with wide.

CASPER Okay. You're right. I look down that the flight plan and saw react and narrow. And then I went back to manual. I may have had it in there all along. Thank you.

CAPCOM Ken, I got a the biocal light mapping camera photo pad for you and TEI 32 block data.

CASPER Okay. Stand by and let me get my books.

CAPCOM You want to start with the photo pad, there's a biocal light you copy at 123:12.

CASPER Okay. I've got that and Alpha that kinda (garble) back along about - - back along about King was the first chance I had to get all squared away again from bay low light level stuff. So I did get a chance to look as much back there as I hoped but back around King pretty interesting stuff again, looking at a crater and some of the beds and things that are in it. Pair of beds and I'm convinced now that we're not seeing beds at all. Through the binoculars it looks like those things are dark material and light material and slumped together and why they form shelves like that I don't have any idea. But you can't trace them through, if they are stratigraphic then they are indeed of - - not only if you had horizontally stratigraphy you had a great deal of vertical fractures that cause these things to slide in different proportions, cause there's no continuous horizontal strata. And you don't realize that till you look at it in detail. Okay. I got my update book out and I got my flight plan here so you can take the photo pad first if you like.

CAPCOM Okay. The first one is a - - the zodiacal light at 123:12. T-start is 123 - -

CASPER I've got it.

CAPCOM - - 09 38.

CASPER Okay. 123 09 38.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 1347 GET 122:50 CM-65/2

CAPCOM Okay, the one next comes in 123:32. There's not a block there for that one because we added that in. But T-start for the mapping camera is 123 31 12. T-stop is 124 31 02.

CASPER Okay, and I - I just 3112 for the start time, I'm writing that in. I don't have a pad and T-stop, tell me again please.

CAPCOM T-stop 124 31 02.

CASPER Okay.

CAPCOM And the next mapping camera pad is at 125:30.

CASPER 125:30 Okay.

CAPCOM T-start is 125 30 05. T-stop 126 29 55.

CASPER T 125 30 05, 126 29 55.

CAPCOM Good. Readback.

CASPER Okay, let me mark that (garble) before you give me any more.

CASPER Okay. Go ahead

CAPCOM You ready for the TEI 32 block?

CASPER Yes sir.

CAPCOM Okay. TEI 32, G&N V&S 38709 plus 072 plus 133 137 12 0788 981 plus 292 20 plus 06997 minus 01 202 181 110 015. Set stars same as CCRT 2 jets 17 seconds. Lamda minus 161.32 and landing site REFFSMAT.

CASPER Okay. TEI 32, FPS G&N 38709 plus 072 plus 133 137 12 0788 plus 292 20 plus 06997 minus 01 202 181 110 015. Set stars same as cert 2 jets 17 seconds lamda -16132 and this is the landing REFFSMAT.

CAPCOM Good read back Ken.

CASPER Hank, can you give me any coordinates on the LM last estimated position.

CAPCOM I'll work on that Ken and did you take any earth shine photos?

CASPER No sir. I tried to get them in last night and we'd decide to close up shop before I could get them in.

CAPCOM Okay.

END OF TAPE

CASPER No sir, I -- I tried to get them in last night and we decided to close up shop before I could get them in.

CAPCOM Okay.

CASPER And I tell you it's going down -- it was much more dramatic the first night than it was last night and it's not as dramatic tonight on the night side passes, so if you can find a place to put it, that is one thing I'd like to get the sooner the better.

CAPCOM Okay, FAO advises that if you didn't take any earth shines, that magazine x-ray x-ray is -- which you're -- I think already have on the night comm is good for the sadonical light rather than changing the (garble) and on this next round --

CASPER Yes sir, I plan to do that.

CAPCOM Next rev you can -- if you want to take some earth shine they suggest window 4 and take away.

CASPER Window 4. Okay, I guess I'll have to check the attitude. Do they -- if I take the sadonical light on an X-ray X-ray do they have a recommended magazine?

CAPCOM Standby. Okay Ken we have a film story for you, if you chose to do the earth shine use mag xx and window 4 and the target should be about -- you should see it about 122 42. If you don't do the earth shine, you can go ahead and use XX for the diacal. If you do the earth shine of course, with the XX, you need the YY per the flight plan for the diacal.

CASPER Okay, I don't think it would be prudent for me to try and get the earth shine and the sadiacal light on the same rev.

CAPCOM Okay, copy. And the surgeon is still anxious for you sometime to find a place to change out the sensors.

CASPER Rog. I understand that. Do you need them all changed Hank or can you send me the one so I don't have to waste time on all that stuff. You got to break out each one of those little things by itself and keep track of it and then -- it takes a good 20 minutes if you change out the whole sensors.

CAPCOM Standby one. Ken the surgeon says he can't tell which -- which one of the sensors is bad, so before we take off and do them all, why don't you try pressing down on them and then let him watch his data and maybe we can find which one's the bad one. Press them one at a time.

CASPER Okay. Let me -- Okay, I'll start on the the ground. I'm pressing the ground now.

CAPCOM Okay, that didn't do it.

CASPER Okay, I'll go to the external.

CAPCOM That seemed to make it worse Ken.

CASPER That's making it worse.

CAPCOM Yeah, that's probably the culprit, but let's try the 3rd one while you're at it.

CASPER Well, maybe that's my problem then. Okay.  
CAPCOM That makes a trace a lot better Ken. I  
imagine it's the 3rd one then.  
CASPER Okay, I'll try to change those 2 out.  
CAPCOM Okay.  
CASPER I'll tell you that little sun angle change  
ole North and South Ray really stand out now. You couldn't  
miss those for anything.  
CAPCOM And Ken for your information John and Charlie  
are almost through getting the ALSEP out.  
CASPER Okay, sounds good. Like an EVA should.  
CAPCOM This is fabulous.  
CASPER I know that's a bad one but you know that's  
about all I can do for you today. That's probably safer than  
having you tell me jokes. Okay with the binocs on the area now,  
I'm looking down into North Ray crater and South Ray and the  
interior structures of those 2 don't look quite the same. There's  
alot more light dark material in the South Ray, but that may be  
caused by the fact that its just -- it really has been a fresher  
appearing crater all around. The area's -- trying to see if I  
can see any shadows or anything -- there's a bright spot down  
there but I think that's just a double spot itself. I don't  
see anything with the binocs that I can say I -- say I can't  
stabilize them quite that well. Coming down the traverse route  
from where they're going across survey ridge, I don't think  
survey's going to be easy to spot and when you get down -- there  
is one definite terrace -- looks like the -- looks like Stone  
Mountain is formed with 1 2 3 terraces but they're much larger  
than the kind of things we were drawing on the map. The rest  
of that is very fine subtle lineations. The area around North  
Ray, particularly up along the area that they were going on the  
EVA -- I can see it now and it almost looks like that little  
pile of material that runs up to the south of there track and  
I'll give you some coordinates on that. I'm looking at my chart,  
oh let's see, 9 Charlie, yeah let's look at chart -- 9 Charlie  
and there's a -- this is pretty lousey picture but if you'll  
remember at a point about CY by 79, if you'll draw a line there  
and then draw a line down to about CU at 81

END OF TAPE

CASPER 79 if you'll draw a line there and then draw a line down to about CU at 81, that represents a ridge which shows up in the photograph and looking down on that vertically, that looks like sort of a flow of material than runs up over the lip of North Ray and down into it. And it shows some craters on it but it almost looks like a flow that runs up and down into North Ray rather than being some of the other kinds of things we've talked about. And I didn't have much time, I'll try to concentrate on that on the next rev.

CAPCOM Roger, good show Ken. Ken do you want the LM coordinates at lat long or do you want the coordinates on 9 Charlie.

CASPER Oh, I'd like to have in 9 Charlie kind of coordinates, that's about the only thing I have to reference to.

CAPCOM That's what I figured.

CASPER Let me see here if I can get -- get one last chance on -- on our old friend that Davey and see if maybe he has decided to show his face this time. Don't let me forget the mapping camera, it comes about the same time.

CAPCOM CASPER could you give us auto on high gain.

CASPER Yes sir, you have auto. I'll tell you Hank, I think that the terminator has got hung up here on a high mountain or something. It just doesn't look like it's moving as much as it is everywhere else on the Moon.

CAPCOM Roger, is Davey still in the dark?

CASPER Well, I'm not to it yet but he sure -- I don't see anything beyond it. Yeah well Alfonses and Archytas show up nicely and here comes the crater chain by golly. Yep, much to my amazement, the peak in (garble) still is in daylight. Oh, I see what's happened now, there's a -- there's a little hill that's shielding -- I see where Davey crater chain is now and it's right in the middle of a bid long shadow that's being cast out there and it's shielding that whole area cuz Davey -- and Davey Y show up nicely and Davey G is easy to see but the chain itself, I can just make out and I'll take a picture -- well let's see that's acute angle, I don't know if I can get enough to show you but -- they sure must not have much of a lip on them if they don't show but that -- by the time we see them, they may be in a fairly high sun.

CAPCOM Roger, copy Ken.

CASPER I'm taking the stretch this time anyhow because it'll show all the area around Davey and there are some craters in there and an awful lot of them that have absolutely no rims, which seems to me it looks entirely different than what you see in -- what you think of, at least things are all very subdued -- they just drop in. You see glows in the low sun you see -- you see the far lip before you see the near lip of the crater. Although there are a few that have raised rims

CASPER and they kind of are the exception here instead of the rule, whereas most low sun angle places we see are -- I'll take a shot down just a little bit to the South there and there the average is red craters and very few rimless ones.

CAPCOM Roger Ken and your about 20 seconds from T stop on the mapping camera.

CASPER Okay, going to it. Thank you. Okay and the mapping camera is off, I'll wait 30 seconds. Man Hank this system is really good. I don't have to give a second thought to -- to what's going on and just by not having to watch that clock, it just frees your hands to go do everything that you want to do. It really -- on the back side I get all bent out of shape with myself cuz I get behind -- I start -- you just don't have a chance to do anything except those items which are timeline ABC and do them in exactly the sequence that they give you.

CAPCOM Roger. The only hitch to this is that I get interested in what you're saying and I might forget.

CASPER Well, just remember, they go in your card. The back side goes on mine.

CAPCOM Actually though, I've got a bunch of guys backing me up.

CASPER Well I tell you this place is so fascinating that you just don't dare let anything go by. It's -- you know I think you could stay here a life time and never see it all. I guess that --

END OF TAPE

CASPER Don't dare let anything go by. It's - - you know I think you could stay here a life time and never see it all. I guess that's kinda a silly statement because that's true in almost anywhere you go. It sure is dramatic. At first glance particularly the back side looks like an old gypsen plant. It just looks like someone poured stuff all over it and just made it - - just trying to hide it, cameflage things. The more you look at it then you start to pick out several differences. Unfortunately I'm not smart enough to know what those things mean but I'm sure we got some folks down there that certainly do and maybe if we get enough data why they can piece together.

CAPCOM Are you going to stand by now with the mapping camera Ken.

CASPER Ah, yes sir, I went to stand by and I took the image motion off.

CAPCOM Okay. Thank you.

CASPER Thank you, I forgot to tell you about it. Ah, let me give you a reading of magazine SS before I forget it. I'm now at 35.

CAPCOM Roger. 35.

CASPER And I guess we can sorta say we have filled the baby square. I don't think we ought to keep trying that. Get a chance while we will but I'm not going to keep trying after.

CASPER And as a back light I'll keep on magazine XX.

CAPCOM Roger. XX

CASPER (garble)

CAPCOM Say again Ken.

CASPER I'm sorry I was playing my tape recorder back to myself.

CAPCOM Ken are you free right now?

CASPER Say again Hank.

CAPCOM Rog. Are you free right now, are you doing something?

CASPER I'm sitting up the camera for the zodiacal light. What did you need?

CAPCOM Okay. I was just thinking in case we loose comm there is one little change - - after we get LOS where you have to configure the DSC, since we've added in this mapping camera pass oblique. We want to get high bit rate instead of low bit rate.

CASPER Okay. Let me write that down. Figure and then says low, you want me to go high. Okay, and if you remind of that just before LOS.

CAPCOM I intend to and in regard to your comments about King were there any other things on the back side that you had of interest.

CASPER I found a couple of items back - - mostly to the - - I think almost all of the things I had a chance to look at this time were to the - - to the West of King. Between there and about AOS I have a chance to look at the swirls, the look at King and a crater where I first felt like I found - - my first comment was that if there's ever a crater on the Moon that's got stratigraphy exposed that's got to be it. And I hope that's wrong because there wasn't any where I was looking. And I took a picture of that one. And there was another little bright ray guy - - a little splashed out crater that looks like so many bright ray ones except that it seems like he's built up on a mound. Got this nice mound with real bright crater in the center of it and all the bright ray material is splashed around it. That too was - - that was about South of Flemming I think, somewhere in that neighborhood.

CAPCOM Okay. We'll see if we can locate it.

END OF TAPE

CASPER Hey, Hank.  
CAPCOM Go ahead.  
CASPER Could you tell me - confirm how many frames are on Magazine XX? Is that 70 - total?  
CAPCOM Stand by.  
CAPCOM Ken, there should be 48 total frames on the mag, and we show you with 42 remaining.  
CASPER Be 8 total. Now, okay.  
CASPER Okay, so I can take 8 frames on this thing and still have plenty for the zodiacal light.  
CAPCOM That's correct, Ken.  
CASPER Okay, there's one. This stuff isn't - just isn't as bright as it was even yesterday. The first night it was really something. There's number 2. Number 2 was not a part of a strip, but rather an interesting (garble) that runs through a crater; and I'm coming up on - I believe this is Grimaldi.  
CAPCOM Roger. We show you north of Grimaldi.  
CASPER I'd swear I'd recognize that double crater feature. Let's see -  
CAPCOM (Garble)  
CASPER You're right. I'm west. It's Riccioli.  
CAPCOM Can you see Riccioli three. That looks like on the map a double - a double-ring crater.  
CASPER Yes, sir. Yes, sir. That's the one I thought was north of Grimaldi, and that's what I'm looking at here. Okay, this is the area where - I don't know if I can get a photo of the things aw last night that were really interesting. They had some - It's not as bright. I'm not sure I can see it all. Yeah, there it is. I don't know if this is going to - Okay, my third 1 here -

END OF TAPE

CASPER                    Okay, my third one here in this sequence was taken of the crossed (garble) and as I commented before when you look out in the dark you get a very dramatic terminator just like you do from the Earth shines like you do from the upshine and there's a place - oh I'll try to get a picture of this because it shows - there's this bright blank on the horizon which is obviously a big mountain chain and I would - it sticks up quite a number of degrees above the horizon. Okay and I guess that's all I'm gonna try to take in this sequence and I'll get back to the. Now I'll take one up to the north here, there's some more interesting things and we'll still be safe. Okay, okay, now I'm on frame 13 so that was frames whatever we had before up through 13 and I'm going back now to the zodiacal light configuration.

CASPER                    Sure do get some interesting sensations when you try to float around in a dark cockpit here and you run into a camera or something and you try to figure out what it was that just tapped you on the back.

CAPCOM                    (Laughter). Roger.

CASPER                    Okay, we're in configuration for zodiacal light. And you want me to do that at 123 05 on time. Is that correct?

CAPCOM                    Ken, I guess you just don't start earlier than that.

CASPER                    I'm talking about the DSE now.

CAPCOM                    Casper, Houston, configure the DSE at 123 06.

CASPER                    123 06. Okay.

CAPCOM                    I guess you can do that and then start the zodiacal light any time after that.

CASPER                    The zodiacal light has to start on this pad time I think.

CAPCOM                    You're correct.

CASPER                    Hey Hank, if you run into Puddy around there somewhere you might tell him that - ask him to tell Stoner and Temple that all those hours they put in configuring the CMS so that it would have the right stowage and all the little goodies would be in place has certainly paid off. Now I can run around - I reach for things and get it all down without feeling like I'm pressed for time, and it's thanks to their keeping that thing in flight the configuration.

CAPCOM                    Okay, I'll relay that Ken.

CAPCOM                    Casper, Houston, you're looking good at LOS and we've got about a minute to go, don't forget your DSE.

CASPER                    Okay, thank you very much. See you in about 40.

CAPCOM                    roger.

END OF TAPE

CAPCOM Casper, Houston.  
CASPER Hello, there.  
CAPCOM Hello. How'd it go on that rev?  
CASPER Well, that's right interesting. On the zodiacal light, I got it done and took the last frame just as the Sun - I took the frame and it said stop the tape and the Sun came up. So I guess that all worked out pretty good. In the process, I missed the settings for a quarter of a second and possibly one of them for a half, because when I turned the filter, it came off. And I figured there wasn't any sense in taking it with the filter in other than its 90 degree position. But the rest of the stuff managed to get done on time. And we rolled out at 31:09 and turned the mapping camera on at 31:09. So you missed about 6 seconds.  
CAPCOM Roger. Copy.  
CASPER I guess it was - Maybe I made it. It was right close - Yeah, 31:12 is when you wanted it. That was a tight maneuver.  
CAPCOM Ken, do you have your man Charlie handy?  
CASPER Okay, Hank. Go ahead.  
CAPCOM Okay. Our best guess for the LM is at coordinates 80 and Charlie Alpha .7. That's about 200 meters northwest of Double Spot.  
CASPER Okay. That's 80 and Charlie Alpha .7.  
CAPCOM That's affirmative.  
CASPER Okay, we'll go take a look.  
CAPCOM And I do have one other Flight Plan change for you. That occurs at 126:44.  
CASPER Okay, go ahead.  
CAPCOM Okay. You know, we told you earlier we didn't want to risk playing around with that Mass Spec Boom, so we want to delete the Mass Spec Retract to 8.4 feet.  
CASPER Okay. That's deleted.  
CAPCOM And at 12829, since we've didn't pull it back, we don't need to deploy it again. We can delete the Mass Spec Deploy.  
CASPER Hank, are you still there?  
CAPCOM Roger. Did you copy that last?  
CASPER No. You just stopped talking, it sounded like.  
CAPCOM Oh, okay.  
CASPER I copied delete the Boom retraction.  
CAPCOM Okay. At 128:29, delete Mass Spec Deploy.  
CASPER Okay. That's cause it's already out.  
CAPCOM That's affirmative.

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 15:30 GET 123:48 CM-71/2

CAPCOM                    Ken, your bio-med letter looks good, now; and I guess that's about all I've got for you at AOS. Did you see anything on this last backside that's worthy of comment?

CASPER                    Oh, yeah, around Mendlestam I was looking at some interesting flow features. And again, I'm using the term flow feature to mean that's the kind of appearance it has, not that that's what it is. And right at AOS - Oh, maybe 3 minutes after AOS - I mean LOS -

END OF TAPE

CASPER Hank, right now I'm looking at some little cross Smitty. And I'm looking at some features that upon one of the subdued filled craters that we see on the northern edge. I - - it's out on a - - outta where I can reach it now, what I was looking at was a crater that all subdued typical of those features in Smitty and they have an outter ring and I think probably the crater I was looking at is the one that's a about - -

CAPCOM That auto on the high gain Casper, when you get a chance.

CASPER Okay. You've got auto. I guess the one I was looking at is the one that's on the map about 85 degrees - - no make that about 84 degrees East and about 2 degrees South, there's a large one there. Then on the North, east side of it, there's little bright ray craters that I first caught my eye on. Then there's an artuic pattern that goes with it that concetric to this large crater. And this bright crater is right at the head of it. This concetric material is very light color and it it were in a straight line you'd say it was ray material. It's possible it doesn't look like a raised rim like the other rims on the concentric crater on the big basen. However, it looks like this little bright ray crater is right at the head of it and it's the bright ray crater that appears to be domed up and just a slight rise then there's a bright crater on top of it. And then what looks like this other ring which is concentric to the big crater. We ought to have that on pan stuff so I won't have to worry about it. Cause it's almost directly into the ground track.

CAPCOM Roger. Can you see Maple from there?

CASPER Not now, I probably could have then.

CAPCOM How far to either side East of the ground dite do you think you can adequately see?

CASPER Not very far. These windoww really - - you're really restricted. Let me see if I can give you a gouge here.

CAPCOM I was just curious. We're going to be coming by Laparouse and Capuanus shortly and was wondering if you could get a look at their central features.

CASPER Yeah, I know you can't see - - no I'm almost positive you can't see that far.

CASPER We'll flying what North of - - South of Black now right? So that means my window #3 is straight down.

CAPCOM That's affirmative.

CASPER Okay. I've got old Laparouse and Ansgarius. Well wait a minute, maybe not. Okay, I can see Loparouse, I missed him. I got out here a little bit to late. I should be looking into - I was always getting confused here. Must be getting close to the subsolar point. It's terrain features are really hard to distinguish. I do see Captain and (garble) and the central

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 1540 GET 123:58 CM-72/2

CASPER feature (garble) is more obvious than the one in Captain from the sun angle.

CAPCOM You just passed the subsolar point Ken. About 3 or 4 minutes ago.

CASPER Yeah, it's a - - pretty hard to see things although I guess I'm equally impressed how much you can see of - - in - - apparently see a lot more than these photographs have shown us.

CAPCOM They're all with a McClearn phase now.

CASPER Yeah, I have trouble with them up here just like I did in school.

CASPER Okay, I'm looking at the central features in Langrenus and you can see blocks with the telescope here. There's actually some fairly large ones on the - - on the western slopes of the Eastern part of the horse shoe. And there appear to be awful lot of them in the little band that appears to be out - -

END OF TAPE

CASPER                   And there appear to be an awful lot of them in the little velouviium band that appears to be out to the South. And I'm trying to look at some of those dark patches that are in the Southern walls. They look like flat dark blocks of material that are in, along the terrace material and I really can't make out a great deal. Terraces in this area are extremely wide and fairly steep and the walls here look relatively steep compared to the other walls around the Moon. This is really a nice attitude for viewing things. I can see natavious as stacks up great big central peak -- I think that's natavious because natavious B is down there. Okay, I'm looking at SCA and SCA A and there around the -- the elongate of the 2, there doesn't appear to be anything that you can pick up with the binoculars except it looks kind of mottled. The interior is sloped like all the rest -- the interior didn't look particularly different on the rounded one. It looks like there's a resistant -- several resistant layers in the sides and I got a picture of those. Look like they're standing out and it does look like there's a connection between the 2 craters. Some subtle thing comes out in the direction of the tail and then as you come out to the west, there's some darker material that runs out and looks smooth and stands out and comes out into the mare and it almost looks like dark material might be -- might be over the crater, although I'm sure that the white -- the light streaks on the -- are the things that are suppose to be coming out. It does appear to me though, that when I look at the -- I've got a place now where I can see the light tail and the -- and the regular mare together and I got a picture of that -- that's frame number 14 on magazine Victor and that -- it looks to me like there is a higher crater count -- of large scraters in the light rayed material than there is in the darker material.

CAPCOM                   Say that again Ken about the crater count.

CASPER                   It looks like it's higher in the light rayed material than it is in the darker stuff, which is I guess what you would anticipate. If you're a band of bright rayed craters frame number 15 is one of those, it's just coming up on -- oh lost my place. Yeah, it's about half way between oh the beginning of the highlands -- Gutenberg highlands and where (garble) is.

CAPCOM                   Roger.

CASPER                   And Hank, at this higher sun angle now when we get down here and we look at this place where the -- where we were talking about the bright rays that seem to take a funny shape between boulder and the little crater out to the east of him, it's not real obvious now that there's anything more than just some bright material inbetween it.

CAPCOM                   Roger.

CASPER                   I'll tell you these sun angles really can

CASPER play tricks on you. And I'm looking at Mouldler now and I got a really good view of him and we discussed the possibility of having material come in from the north and run down inside of him and it's not that obvious when you look down on it from here, there's material that runs over you see a little high and as you look down inside, you see light dark material, the same kind of combination you see in other craters. A naked eye -- it looks very much like there's an expression that says this ridge to the north ran down inside there and formed that little tongue, so when you look at it in blown up detail you see some vertical -- now I can see places where I can see a flow pattern that's run down in and as a matter of fact, I'll get a picture real fast. Hope that gets it.

CAPCOM Do you think that -- just looking at a map here -- do you think that what you're seeing could be an expression of the rim of Descartes?

CASPER No, no I sure don't because this has a nice margin that curves down in and rolls down as though it had -- it starts where there's a little -- little terrace, a little -- looks like part of a crater terrace and it runs down inside and runs out and forms that central feature and it runs down on the floor and it certainly appears that it came and rolled down on there after the crater and all its slump features were already there. And -- we'll have to come back to the question of its relation to theophilus.

CAPCOM Roger.

END OF TAPE

CAPCOM Ken, for your information, John, and Charlie are at Flag now.

CASPER Okay, I'll wave to them. I'll tell you, NASA needs to recruit some octopuses. I could really use a couple of more hands.

CAPCOM Roger.

CASPER Okay, I'm going to concentrate on North Ray, and I distinctly believe that the area that the traverse is drawn on that goes up on the North Ray and comes up on - material looks like it is flowing around. It is part of the basic furrow Descartes unit that is mapped back further to the east, and it looks to me like it runs down around the crater and drapes into it.

CASPER I can see evidence of stratigraphy in North Ray, and lots of it in South Ray; and as we come across at - Boy, I tell you the general topography down there looks about the same all the way across the board.

CASPER And just at a cursory glance, we're coming up on Albategnius now; and the material that's over to the east of it, that kind of hummocky, undulating material, is furrowed, and it looks very much like the material around Descartes. I said it did in very low Sun, and it has the appearance of having many of the same characteristics.

CAPCOM Have you got pretty good shadows in this area now, Ken?

CASPER Uh, the shadows that are right here, coming across Albategnius, they're pretty well cleared out. You just get the shadows from the very big peaks and the -

CASPER In fact, Ptolemieus - it's almost completely clear of shadows. Alphonsus still has some. I can pick out the crater chain, now. It's just now getting out of the shadow; and sure enough, there is a great big little ridge that lays across the front of it; and it's been masking it all this time. Four of Ptolemieus looks to me like all the rest of the Cayley material. It's got a great deal of craters, as you can see from the pictures. I would say that hundreds of them are rimless; and as they get a little larger, they start to form with - very subtle rims. I guess I can't say that they're all rimless. There is one - looks like a fracture, about in the middle, and it may be scarp that's caused by a fracture, or it may be a flow pattern.

CASPER And, as we come up on the Davy chain, it appears that they do have - they don't each have an individual rim. There is mottled material in this area, and - I'm going to try and get that Magazine. I think you need to see this. Can you get me the settings for - to take a picture on this real fast?

CAPCOM Stand by.

END OF TAPE

APOLLO 16 COMMAND MODULE, 4-21-72, CST 1611, GET 124:29 CM75/1

CASPER Houston, VH VW.  
CAPCOM Okay, I'll - we'll see if we can get them Ken.  
CASPER Okay. I'm gonna take one here now at - that was 56 and 1-1/25, I'll take a 2/50th. Second ones a 2/50th and that ought to bracket it, I hope. And that's in the crater Gene itself. It just - it appears that they're essentially rimless but the whole area down there is kinda mottled.  
CAPCOM Roger, do you use the EL for that?  
CASPER And a very pretty scarp. No, I used VHW.  
CAPCOM Casper, Houston, your coming up about 20 seconds to T stop.  
CASPER Okay. Thank you. Give me a call at T stop.  
CAPCOM Lock it, T stop.  
CASPER Okay, we're at T stop. Thank you. Okay, and that's - we're now in frame 36 on magazine SS.  
CAPCOM Okay, you can go standby on the mapping camera and image motion to off.  
CASPER Okay, standby and image motion off, barberpole ray. It's very interesting Hank, I've got a little stranger back here that's trailing me, must be one of Casper's friends.  
CAPCOM Alrighty. Well -  
CASPER There's a little light just sitting out there. I guess he's - I have no idea how far away it is - you know it - I had the impression it's like 10 feet but it could be a 100 feet or a 1000 feet but it's apparently some little particle that's in orbit with me and it's probably rotating, it's winking. I first saw these last night when I thought I had seen something on the ground, then I realized that it was moving at the same rate I was. Every now and then I look out and I see these particles that are reflecting around me.  
CAPCOM If you see a blue one winking you better pull over.  
CASPER Mass Spec guys might be interesting. And if I hear someone say beep beep I'll wake the SPS or something. The mass spec guys might be interested in that though.  
CAPCOM Okay, They are listening.  
CAPCOM Casper, Houston.  
CASPER Go ahead.  
CAPCOM Rog. To make up some of this SIM bay data we lost here we'd like to make a real time change since we got to maneuver over to the north oblique here in about 40 minutes or so. We'd just like to now make a maneuver to

APOLLO 16, COMMAND MODULE, 4-21-72, CST 1611, GET 124:29 CM-75/2

CAPCOM plus X SIM bay and we'll take SIM bay data  
to you after roll on over (garble).

CASPER Understand you'd like for me to go to  
plus X forward SIM bay attitude now.

CAPCOM That's affirmative.

CASPER Okay. I can do that and eat at the same  
time.

CASPER Henry, I understand you want me to go to  
the north of light photo attitude.

CAPCOM Negative, now we want you just to go to  
the plus X SIM bay.

CASPER Or just to the - Okay, fine.

END OF TAPE

CAPCOM            You playing music Ken?  
CASPER            Yes sir, how do you like (garble) from space?  
CAPCOM            Sounds alright.  
CASPER            I know you don't like him even -- you don't even like him at home. I tell you this has got to be absolutely central. It's too much fun to be anything else.  
CAPCOM            Okay, I see you're at attitude.  
CASPER            Okay, thank you. Good call, that will keep me from having to do it again.  
CAPCOM            And Ken, to fill you in, what we're after to get as much of this SIM bay data as we can, since we missed some of it. The (garble) needs alot of it and if you got your flight plan in front of you at 125 15, we're suppose to now -- then move over to the 40 degree north oblique. FAO says that maneuver takes a maximum of 3 minutes, so if you could delay starting that until whatever you figure's a reasonable time before the mapping camera T start, then we can -- we can get a pretty good slug of data in there.  
CASPER            Okay, be glad to do that. How's our little laser coming along. Is it doing any better or any worse? I guess we haven't had it on since you gave me your report though.  
CAPCOM            It's still toggling Ken, I guess when we get it back running again, we'll be getting about 80 percent with it.  
CASPER            Okay, is that ladder network working? Or is it a different problem?  
CAPCOM            It's working okay Ken.  
CASPER            Hank can I give you some comments that really are not pertinent to anything we're doing but little observations that I had a chance to make and I'm afraid that I'll forget them. Got too many things stored up in my head now.  
CAPCOM            Okay, go ahead.  
CASPER            But one of the things, I just sitting here looking at the equipment and -- some of the things that have caused more interest than others in what we were doing and one of the things that is at the heart of alot of your time in this spacecraft is fixing something to eat and without discussing whether or not you need to eat this much -- just the idea that even if you try to eat part of it -- it takes an awful long time to fix each of these things and one of the big hangups is we all get clustered around the water gun. We've talked about gas coming out of the water gun and this is not the drink port but the food preparation station and if you -- one of the ways we found we can induce gas bubbles into the water was by depressing the plunger before it had had a chance to complete its stroke. When you let it complete its stroke, it seems to give you a nice relatively gas-free shot of water and it looks like that the hot water gives you more for an ounce than the cold water does

CASPER but if you're very meticulous about waiting till you're sure that the plunger's made its full travel and then count to 10 or something before you push it again, the cold water isn't quite as short as it looks like it is and I don't really know how to explain why we have gas bubbles sometimes and why we don't. It's almost as though the gas separator -- may not affect the problem. We started out in the first couple of days and we didn't have any gas -- I guess about 2 days, then on the 3rd day, we started getting gas in the hot water and we were getting like 50 percent gas. We tried the cigar gas separator and that -- that -- after we got it flushed out the first time it seemed to work pretty well and then it started getting gas so we decided to try the -- the prototype model and when we put it on the feed station why as soon as we put it on, why we made a squirt and nothing came out and decided to try it again and by then it was obvious that it was building up pressure inside -- that the food station was putting out water and it wasn't coming out the other end and we never did get water to come out the -- the outlet side of the new gas separator and it looks like it has a crack in the top, on the inlet side and the water was bubbling out of that -- it was coming out under pressure when we took the thing off, why you could tell that the check valve or something had never been open, so we really don't know whether that thing has any affective use or not. And it seems like the more water you use the more gas you get and I don't I'm not sure I completely understand that. You get more gas in the hot water than you do in the cold water but the water I've been getting out today and yesterday has been almost gas-free. I can spin it up here and I won't get -- I'll get a zone of less than 10 percent gas and that's 10 percent of a 7 ounce food -- juice bag. The other day we were getting 50 percent and I really can't psyche out exactly all the causes for it. The cigar food -- cigar dispenser there has some problems of its own and everytime you get through with it, it dribbles and it'll dribble for quite awhile, but I found that if you put the little cap on it right away, that it quites dribbling and it's only that initial dribble, the rest of it from there on is easy. I really don't expect anything to be done with these comments. I didn't want to -- we were suppose to evaluate these things Hank and rather than write them down -- it's alot easier to put them here and I'll get them off the tape after the flight.

CAPCOM Okay, I took notes there on most of that.

CASPER Okay, I'm sorry I should have told you first, I really wasn't anticipating you having to copy all that. I'm kind of rambling and being verbooust but I can see I'm just not going to get everything I see written down. And I probably ought to go ahead and get it jotted down some way.

END OF TAPE

CAPCOM Ken, it looks like the next accent in the flight plan for you is around 125:13 where it says (garble) I think we've scratched out everything ahead of that.

CASPER Okay. I'm taking advantage of that to get the lead done. Maybe we'll have a chance to look at the back side this time.

CAPCOM Okay.

CASPER Hank, there's one other thing I'd like to comment on before I forget it.

CAPCOM Go ahead.

CASPER That's the cockpit temperatures. I didn't notice the little gauge and it doesn't never move. I think it's gotta - - I think it's plugged into a dummy mode somewhere. But the cockpit temperature does infact change quite a bit. And on the way out in PTC with the three of us in here, it never really got cool enough even for people that's warm blooded as Charley and I. And we were wondering you know geeif it was like that in PTC what was it going to be when we got in orbit. And the first day in orbit there it was - - it really was kinda hot and stuffy. And I don't know whether it got cool but last night it was nice and cool and infact I woke up this morning because I was cold, that was the reason I woke up. And in the past I've had a hard time sleeping sometime because it was warm. I don't know whether that's caused by going to the 60 circular orbits or whether that's caused by having only one body to take care of in here instead of three. But it was very obvious unfortunately we'll get a chance- - I couldn't tell you yesterday I was wearing a suit so I never was really comfortable most of the day. Anyway when John and Charley get back we'll notice again and see if it gets hot again.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 16:42 GET 125:00 CM-78/1

CAPCOM Casper, Houston. We're about 2 minutes  
from LOS and everything's looking good from this end.

CASPER Okay, Hank. You're cutting out, but I  
understand.

END OF TAPE

CASPER Hello, Houston, are you there today?  
CAPCOM Hello, Casper, how did it go?  
CASPER Just fine. Having a ball.  
CASPER Got all kinds of neat little things seen on this last rev. Had a chance to start watching right at the terminator and just kind of watched the scenery as it came by in AOS. And I think I did wonders for the magnification of these binoculars by cleaning the lens. I'd about given up on them and decided that they weren't as good as I thought they were, till I found out that one side had somebody's big greasy thumbprint on it. Somebody probably being me.

CAPCOM Roger.  
CASPER And, right now on magazine victor, I'm up to frame 37.

CAPCOM Roger, Victor frame 37. And Ken, I got some PADS for you.

CASPER Okay, let me get my pencil and paper.  
CAPCOM First ones at 126:20, a UV photo pad.  
CASPER Okay, hang on a second. Let me get everything velcroed down. Okay, say again the time, please Hank.

CAPCOM 126:20.  
CASPER Okay, 126:20. Alrighty.  
CAPCOM Okay, P start is 126 19 26.  
CASPER Okay, 126 19 26.  
CAPCOM And, just for info, somewhere around 126:35 we're going to get you a state vector update. The next PAD time is at 127:18.

CASPER 127:18. Go ahead.  
CAPCOM Your gamma ray deploy time to 15 inches is 14 seconds.

CASPER Okay, that will be 14 seconds.  
CAPCOM And your T start for your PAD - mapping camera pad right there is 127 27 58. T stop 130 28 19.

CASPER Okay, 127 27 58, 130 28 19.  
CAPCOM Okay, and the pan camera is 128:13.  
CASPER Okay, stand by a second.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/21/72 CST 17:39 GET 125:53 CM-80/1

CASPER Okay. What's the next one now. At ah -  
128:13 did you say?

CAPCOM Roger. 128:13. The pan camera photo  
PAD.

CASPER Go ahead.

CAPCOM P-start is 128 19, 09, 128, 20, 47.

CASPER Okay. 128, 19, 09, 128, 20, 47.

CAPCOM Okay. That's about all the PANs. You  
say, you saw some interesting things on the back side, huh?

CASPER Yeah. The real Moon's just like photos,  
the more you look, the more you see.

CASPER You'll be happy to know though, that  
until you get use to it the craters on the real Moon get  
turned inside out like they do down there, on the photographs.

CAPCOM Really?

CASPER Real frustrating.

CASPER What'd you say, Al.

CASPER It's not always clear which way to turn  
them over.

CAPCOM Roger. Understand. Hey, I got a little  
information on some of the gamma ray results if you are interested.  
Ah - in case you're interested in doing some sort of global  
observations relative to the color or character of large areas  
on the Moon, early gamma shows that the highest regions  
occur in the maria areas in the west and including Neubium,  
Cognitum and Poselar. The next highest are in the central  
highlands from -

CASPER Is the highest up in the maria to west.

CAPCOM Roger, in the west. Ah Neu -

CASPER Neubium (garble).

CAPCOM Right. And, the next highest is in  
the central highlands from Neancler to Alphonsus.

CASPER Okay. You say the highest regions,  
highest of what? Just ah -

CAPCOM I guess that the highest - highest  
counting rates in the gamma spectrometer.

CASPER Okay.

CAPCOM Third highest, is maria the Curtius  
area, and the lowest regions occur on the far side highlands.

CASPER Bill, I can't ah - I can tell you they  
sure look different, they're all black over there.

CASPER That's always intreging when you  
can't see something.

CAPCOM                   And, Ken, these light colored markings you reported near King Crater, the west of King. Brooks says those are near Crater Abbawaupha. And, these may be similar to the swirls of Avenyetus, but not identical. And, for your information the markings of Abbawaupha he used the term antephotal or opposite to Euchellie on the western part of your track.

CASPER                   (laughter)

CAPCOM                   That means that it's 180 degrees from there.

CASPER                   In other words, it's offly, rog., rog. - It's awfully hard to find a place where there ther - 180 degrees away there won't be a crater on the Moon.

CAPCOM                   Roger.

CASPER                   He'll understand.

CAPCOM                   Casper, high-gain on the auto. Auto on the high-gain.

CASPER                   Sure can.

CASPER                   I got one's that better for him this time though. I'm not at all sure that those swirls that I saw of the northwest of King are really like the others or not. I tried to get a look at it (garble) this time, but still a little too far to the north.

CASPER                   You know, Henry, one of the things that impresses me, is when you look at the mare surface in very high sun, like I'm doing now, a lot of the very shallow craters that have just very subtle sweeping walls either together in a chain or in groups; when you see this at high sun it looks exactly like swirl patterns. If you didn't know what it was, you'd probably would wonder about it also.

CAPCOM                   Roger.

END OF TAPE

CASPER                   And Hank, would you give me a warning about  
126:18.

CAPCOM                   Will do.

CASPER                   Hank, looking in the bottom floor of Messier  
I think it's the original Messier that elongate one. The bottom  
dark material has a little ropy white material that runs down the  
length of the crater. And at one end it looks like it's - -  
sort of like high water mark on the Northern and Western end of  
that it looks like it may have been a high water mark and maybe  
the stuff had just dropped down. And you see little blocks of  
that stuff - - kind of like the whole thing had been floating and  
it just sunk a little bit. When I look in the wall of the other  
one, the round one it appears that there's a depression in the  
North west side where it's kind of pushed in and things may have  
run down in there. I had the distinct impression that there was  
an original crater that is not part of the bright one that we  
see now that's over on the western side. Yeah, as a matter of  
fact, Messier does show a secondary crater, and I have the  
impression that that was an old crater that kind of smooth and  
darkened and looked like the rest of these older craters. And at  
Messier (garble) on top of that or at least forms subsequent to  
that and it kind of broke into that wall.

CAPCOM                   Roger. The map shows an indication maybe  
there might be a secondary there.

CASPER                   Yeah, I had thought maybe that was a cherius,  
kinda like a slump feature, but apparently that's not the case.  
I wish we had some low sun pictures of this. Uh, a crater and  
the bright splash rays that I took a picture of before. It's  
about half way between Messier and Centerinus. I swear it's on  
the top of a very shallow rise. And it appears to me that there  
is a very slightly darker albedo in the material underneath it  
that goes out about the same diameter as the bright ray. Now  
it might be that the bright rays are giving that characteristic  
just because they may be tenuous (garble) they don't show up by  
themselves but they may be there. There's another one a little  
smaller than - - it's about half way between the one I just  
described and Centerinus. And there's one that I agree with Stu  
that has black things that drape down inside it like that might  
be one of them. But maybe when I get closer it'll look like  
shadows, it's kinda hard to tell from here. There are an awful  
lot of blocks around it it appears. Uh, looking now at this  
bright depress crater that's next to it - - I'm going to try and  
get a picture of that the next time I get the camera available !  
because this white stuff runs down the side of a very smooth  
brown crater and the place where you can see it is right out  
on the floor in the bottom and it has a very strange appearance.  
It didn't - - the white stuff is like it ran out and it just stopped  
abruptly. There's no toe on it or anything.

END OF TAPE

CAPCOM CASPER Houston about a minutes to go for your UV.

CASPER Okay, thank you sir.

CAPCOM And Ken you don't have to acknowledge but John and Charlie just got back in their LM and they've just repressurized.

CASPER Okay, I think it shows that we're at the prime to do this, however it looks like we're not up to Descartes yet, and the camera's pointing along towards Kant.

CAPCOM Okay, flight plan calls for leading it by 2 minutes, Ken.

CASPER Okay Hank, I got it done. I guess I made one mistake there, I didn't get the engines off. I didn't hear any firings during the time that I was taking the pictures but I didn't get to free.

CAPCOM Roger. And Ken, the guys are back inside and I don't know whether you heard it awhile ago or not but the EVA 1 was a total success. They had a 7 hour and 11 minute EVA.

CASPER Outstanding. They have anything particularly significant to say or --

CAPCOM I didn't catch all that, let me ask --

CASPER Did they get any surprises in the things the saw that they didn't expect.

CAPCOM I guess the big thing, Ken, was they found all breccia, they found only one rock that possibly might be ignia.

CASPER Is that right.

CAPCOM Hey, I guess the guys were a little bit surprised by that.

CASPER That calls for a session with this one. Yep yeah. Now it's back to the drawing boards or where ever the geologists go.

CAPCOM Hey, Ken, Ron's asking what you were wearing last night when you got cold.

CASPER I was just sleeping in my sleeping bag -- I mean all I had to do was get up and put on my jacket and trousers. Up to then just getting into the sleeping bag was almost too hot.

CAPCOM Roger.

CASPER Okay, we're at frame 60 on magazine 00.

END OF TAPE

CASPER                    Okay, I got a real good look at the Davy Chain now and they are definitely all rimless. There are some they run kinda northeast, southwest and their are a couple of very subtle constructional features that just look like little - little bubbles of material that run more north and south. They cross the Cichus Chain but - in fact, where they cross it it kinda breaks it up but the craters in the chain themself don't look like they have any rims at all.

CAPCOM                    And Casper, Houston, you're coming up on about 15 seconds to T stop for the mapping camera.

CASPER                    Okay. Thank you. And the mapping camera is off.

CAPCOM                    And Ken, have you done the rest of the things there?

CASPER                    Coming up to it now. Thank you. Going to standby. And image motion off, and it's barberpole and gray. And here comes the gamma ray shield. Field is off now.

CAPCOM                    And if you'll give us accept we'll uplink state vector.

CASPER                    Okay, you've got her.

CAPCOM                    Casper, the computer's yours.

CASPER                    Okay, thank you. Okay, and I'm taking magazine XX out of the 35 and I'm going after magazine ZZ.

CAPCOM                    Okay.

END OF TAPE

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CASPER Hank, you know, I mentioned to you yesterday that that old GDC was really hanging in there. And I think it's drifted less today than it has before.

CAPCOM Hey, that's just fantastic. I never saw one in the simulator like that.

CASPER No. We asked them to put in big drifts so that we wouldn't get in the habit of trusting it - you know, without keeping in mind you've got to keep dressing it up. And so help me, this thing - I'm going to run you a drift check here when I get through with this maneuver, but I'll bet you it's - you know - one degree an hour in roll is about it.

CAPCOM Casper, Houston. Can you terminate the Bat B charge?

CASPER Sure can. And it's Off.

CAPCOM Okay, and we want to get gamma ray shield On.

CASPER Okay. The gamma ray shield is coming on now.

END OF TAPE

CAPCOM CASPER on the delta.  
CASPER Ah, you're already on the delta.  
CAPCOM Boy, it sure sounds bad.  
CASPER Yeah, it does. Anything else go with that  
Hank?  
CAPCOM Say again.  
CASPER Does anything else go with that?  
CASPER Hank do you read me at all?  
CAPCOM Roger Ken, I'm reading you.  
CASPER Oh okay, I just wondering. I got a lot of  
noise but I hear you loud and clear whenever you talk.  
CAPCOM Roger, same here.  
CASPER Any word on how the LM consumables are  
looking or is it too soon to tell?  
CAPCOM I haven't heard anything yet, Ken.  
CASPER Have they said anything about which -- if  
they only run one more EVA, which one they'll run?  
CAPCOM Standby. Ken, they're still looking at  
whether we've got enough consumables or not. However tomorrow  
they are going to proceed with EVA 2.  
CASPER Okay.  
CAPCOM CASPER Houston, we got just a few minutes  
here to LOS and everything looks good from this end. We'll  
probably do a shift change in here, during LOS tool come on  
and I'll see you in the morning. A nights reminder to con-  
figure your DSC at 127 01.  
CASPER Okay. 127 01, I had high bit rate and command  
reset. Okay, thanks a lot, Hank. You've been a big help today  
See you in the morning.  
CAPCOM Okay.

END OF TAPE

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All dead air.

END OF TAPE

CAPCOM (garble) Goldstone.

CAPCOM And CASPER Houston standing by.

CASPER All right, Stu. Be with you in just a minute as soon as I find out where I am here. I just took a picture and now I don't know how to tell you where I am. Aah, it's really bad when you switch from window to window and try and figure out where some of these things go to. Okay, Stu, I'm -- I don't think we got any -- any open items.

CAPCOM No, we're -- we're pretty clean here. I've got a question for you, if you look at the landing site again, but that can wait until after you finish with campaign and so forth.

CASPER Okay, that's probably a good idea. I got a pretty low saturation level. I'm -- I got a good look at the-- at both the (garble) that your bright ray on should (garble) on this last pass and I really don't know what to make of all that -- that -- you're right about the location of the bright rayon campaign, so I guess you win on that one. The thing that I thought was rather intriguing about that was that there are all kinds of big blocks all around the outside of it and all around on the inside too. You get -- it looks like a great big mud pie. I really don't -- don't know how to put it all together. It certainly doesn't have the characteristics of any kind of a violently explosive thing and I got to looking around at some of these other craters and I was speculating on whether or not they're -- the fact that everything is soft back here on back side and how that compares to the front side and I guess one of the things that strikes me is that everything back here really isn't that soft. It's soft in the that the colors are very uniform and the --

CAPCOM Could I interrupt Ken.

CASPER in -- you don't have deep crevices. Go ahead.

CAPCOM Okay, you probably just about in the area here for -- to look at (garble) your V6.

CASPER Oh, thank you. Looks to me like I ought to be quite aways from Campaign.

CAPCOM Okay, you are. It's just -

CASPER I'm just now coming up on Smythii.

CAPCOM Rog, I agree with that. This is the time you've got listed as to start your preparation, and yea, you probably got about 5 or 6 minutes.

CASPER Okay. Yea. I tell you all those hours we spent looking over these things so you can recognize them with out the map was sure a big help. You can just look out there and general know about where you are. Except there places here on the backside where I still have to get my map out in order to sort our what I'm looking at. It does look an awful lot alike in places

CASPER                   yet, you look down in it and I think the only reason that everything here looks alike, is it just like everything back here has been dusted with something.

CAPCOM                   Yea, I -

CASPER                   There's still these, there are sharp features. Yea, there rims and crater that are sharp, and there are steep sides, and there's all kinds of things that don't go along with the concept of being weathered down and old. And with the binoculars they really bring in an awful lot of things, and you see that there are, there is absence of the little tiny craters, and all is an over abundance of great big guys. On a small scale you don't see nearly as much. It's just like everything back here had been dusted over, and not so long ago on a geologic scale. You do see flow fronts and all kinds of thing back in there, and just like you do in the Mare surfaces and you see little - haven't seen any ridges to speak of, but I've seen an awful lot of flow fronts that run up and down things. And I don't see an awful lot of elongated terrain that we would characterise with Descartes, except the, way back near the 180 point. And the rest of it is almost unique to the backside, I think.

CAPCOM                   Okay. All that sounds real great, Ken. Hey, that bright ray on (garble). What did you make of that dark stuff. Does that really drape over the side?

CASPER                   Well, I haven't been in a place where I can see that, and look down on it, but during our first REV after DO - no, yea, the first REV after DOI, we passed right a beam on that guy, and I got you a nice oblique shot of it from what looked was right next door. And it's got very sharp rims on it. It's got dark material around it, on the inside and the outside, and I guess it's draped, but it looked to me like it was a very sharp feature. It had all the appearances of a, of a, what you would have think was of a fresh strata volcano would look like as a little-bitty guy, and white stuff looks like snow on it.

CAPCOM                   Very good, and thank's for taking my picture.

CASPER                   That was pretty spectacular cause we were about, only about 30 miles high at the time, and that makes, really did make it look like it was right next door.

CASPER                   I did find one place up, I think it's in (garble), where I'd swear there's a hole in the side of the crater wall, and stuff is -

END OF TAPE

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ORION Hello, Houston. I'm Up on Comm. How  
do you read? Over.  
CAPCOM Okay. You're five-by there, John.  
ORION Okay. Coming out of my suit, now,  
Tony.  
CAPCOM Okay.

END OF TAPE

CASPER Well, that might be better than my music. (laughter) you never know.

CAPCOM No, if you can't play me "Ridin Old Paint," I don't want any singing either.

CASPER Okay. Well, have it your own way. You don't know what you're missing.

CASPER Oh, we sure picked a lousy attitude for this observation.

CAPCOM Thank you.

CASPER I don't care what they say, hanging upside down I don't do so well.

CASPER And, we're sitting here in an awfully high sun angle, which makes ah - the features difficult to identify. But, I have Ansgarius located, and there's Loperous. And ah, old Loperous looks like an old Langrenus with a big star in the center of it.

CASPER Boy I tell you. You can hardly make out much of anything about the Captine due to this high sun. No I'm afraid I won't be able to see anything about Captine. We're past it now and at this high sun you just can't make out much of anything. He's a little too far off the ground track in this attitude to come to what we are doing here scrunched up in the corner of a weightless. And I guess I'm looking almost straight south now. Boy, there's one set of peaks that stick up down there that are really huge. Stick up over the horizon and they look like the Andes.

CAPCOM Okay, we copy that, Ken.

CAPCOM (garble)

CASPER Say again, please. Okay, Stu, you said you had some questions you wanted to ask or something. Look at this time.

CAPCOM Okay Ken. This is just a sort of a general question about the terraces and --

END OF TAPE

CAPCOM                    Okay, Ken this is just sort of a general question about the terraces in stone mountain and if you get a chance, why look down around the south end of that EVA 2 traverse down around station 5 and just might look in that area and see if you can give any tense on how definate those terraces are. They are going to try to establish that station 5 on the first terrace and you think it looks definate enough whether that's a no sweat operation or just how easy it looks to determine between the first, second terrace so forth.

CASPER                    Okay, I kind of looked for that and let me take another look specifically at that. It appeared to me that - probably on the ground wouldn't know you were on the first terrace, but let me take another look at that. I'll check it out this time. And again, we're only guessing what - you know - trying to guess what it would look like if you indeed were that far down.

CAPCOM                    Rog and this is sort of a no sweat type question Ken, so don't worry too much about it, we'd just like to have you lap that area again.

CASPER                    Okay. Did they get a chance to drive the rover around very much?

CAPCOM                    Yeah, the rover went real well I think they had got it pretty much everything in on the first EVA that they had planned on.

CASPER                    I bet those are two tired guys by now then.

CAPCOM                    Yeah, I expect they probably are Ken. They got in 56 pounds of rock today.

CASPER                    Very good, we got a place for them. Did Hank tell you we've got a couple of little casperillos flying along with us?

CAPCOM                    No, I guess I don't get that one, Ken.

CASPER                    Well, the first time I noticed, it was I guess it was yesterday evening, in fact, maybe you were on when I say the little particles flying along with the rafters after the ground goes into darkness and you're still daylight. I think you can see all these things against the ground, and they all flicker and speckle and they kind of tumble along and this morning we came out and I guess we were going minus X and I looked out the center hatch and here was this little thing just flying formation on me and in the dark I couldn't tell how far back it was. It was just in there - apparently it was tumbling because it was giving it little flashes in and out. And it didn't look like it was opening or closing or anything else - it just was sitting there.

CAPCOM                    Yeah, that sounds like a real live Casper to me Ken.

CASPER                    Well it's so small it's probably a Casperillo.

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CAPCOM All right.

CASPER I'm looking at the - down at the central peak in Theophilus and it has all that same cross-patched, up here it's on the shadowed side that we saw on Silver Spur and Hadley.

CAPCOM Okay.

CASPER Okay I put power on the pan camera and the barber pole is back to gray.

CAPCOM Okay, I copy that. Good. Standby stereo and power and you are a minute and 20 seconds from T start.

CASPER Okay, passing over COMM. I'll tell you the old landing site really stands out now. You couldn't miss that for anything and wasn't that obvious at the lower sun. Unfortunately, I'm a little too far south to be able to give you a good answer on those terraces but I'll give a hack at it.

CAPCOM Okay, copy that and you are 45 seconds from T start.

CASPER Okay, and I'm just over here standing by.

END OF TAPE

CAPCOM You're 10 seconds from T start.  
CAPCOM And (garble)  
CASPER (garble)  
CAPCOM Okay.  
CASPER And I have a barber pole on gray.  
CAPCOM Okay, and you've got an image motion,  
you want barber pole.  
CASPER Beg your pardon.  
CAPCOM Okay, you want to take your image motion  
to barber pole.  
CASPER I'm back to the observation.  
CAPCOM Okay.  
CASPER Does that take priority or the observa-  
tion?  
CAPCOM No, go -  
CASPER Yes or no.  
CAPCOM No.  
CASPER Yes, I think they will be able to recog-  
nize that they're on the first terrace.  
CASPER Oh, I don't know. Over by Cinco, they're  
not that obvious, they are further around to the west, but  
I'm not sure they'll recognize the first terrace. They  
might recognize Cinco.  
CAPCOM Okay.  
CASPER Okay, I'll get the image motion now.  
CAPCOM Okay, you're 10 seconds to T stop.  
CASPER Stand by.  
CASPER Roger. Standing by for T stop. Okay,  
back to standby. And we're barber pole on the image motion.  
CAPCOM Okay.  
CASPER Thank you sir.  
CAPCOM Roger.  
CAPCOM Okay, and the lens are stowed, you can  
go PC OFF.  
CASPER Okay, pan camera power is OFF.  
CAPCOM Got you.  
CASPER Boy these -  
CAPCOM And are those high gain AUTO, Ken?  
CASPER You'd swear that you ought to be able  
to see the LM with these binoculars. I think if you knew  
where to look exactly, you might be able to see it, but  
you couldn't hold anything in your hand, any more sensitive  
I'll tell you, the Cinco craters stand out very nicely and the  
Crest Crater is very obvious from up here. But it looks  
like the path you've drawn to go from station 5 to 6 and 4,  
that path looks to me like it runs down a sort of a batalt  
of material that you're going to drive up and then those

CASPER White lines we've got drawn on chart 9 Charlie, really aren't obvious at all. When you get over around more on the South Ray side you start to see these things, but it's just not at all obvious that they're going to see anything down that path.

CAPCOM Okay.

CASPER They've got a good nav system, they should be able to find Cinco.

CAPCOM Okay, now I heard earlier that you could see Double Spot with binoc's. Is that right, Ken?

CASPER That's affirmative.

CAPCOM Okay.

CASPER They're really neat.

CAPCOM Okay, and I'm sure they passed on to you that the LM should be 200 meters northwest of Double Spot.

CASPER Yes, I just - every time I've gone over, I've been looking for something I thought was probably more worth while than just the gee whiz of my saying I saw the LM.

CAPCOM Yes, I agree with that priority.

CASPER I wish - I really wish we'd have gotten into North Ray, maybe they'll still get a chance cause it looks to me like that's a pretty interesting path up there, interesting from the fact that it looks like it's constructional, that ridge that runs up to North Ray Crater.

CASPER You know that central peak that we've all been looking at in Alpetragius, and thinking it was so big, it can't be so terribly big because - at least it can't be terribly tall cause it's just now sticking its nose out in daylight. And the terminator passed here a long time ago.

CAPCOM Okay, good observation, Ken.

CASPER Boy, that straight wall really shows up from here at this sun angle. That's a pretty interesting thing. It's interesting enough to rate number 36.

CAPCOM Okay, and I guess you're rocking on ready for you terminator photos here.

CASPER Yes, I'm sitting right here waiting to get a little closer to them. I got Lassell and Alpetragius B, all lined up for siting.

CAPCOM Golly.

CASPER There are a lot more of these sharp depressions, I don't know whether to call them Grabins or what, but these little sharp lines that run across - there's a lot more of them than I would have guessed you'd find.

CAPCOM I suspect they're showing up now in the little sun angles -

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CASPER                    Yes, they really stand out in the sun. One of the things - I'm looking at one right here that's next to Lassell C - I'm going to start my strip and talk a little bit while I'm doing it, and that's at - just to the north of Lassell C in that highlands clump that's next to it there. And it looks like in the low sun on the outside of it, you see all kinds of craters. You know the typical low sun angle pictures of crater patterns. Down in the floor of this thing it's just as smooth as a whistle, like someone had drug a - something heavy through there and just made a deep impression.

CAPCOM                    Okay, got you.

END OF TAPE

CASPER You know, it's not real obvious whether I see the in point to that strip. I think we draw and I think I see but it looks like an awful lot of other craters in this little sun. We'll have to wait till the higher sun to see if there really is a difference.

CAPCOM Okay.

CASPER Okay, Magazine SS is now reading 47.

CAPCOM 47 on SS.

CASPER Okay, it's time for a little gamma ray deploy.

CAPCOM Roge.

CASPER Mark, it's coming out.

CAPCOM Okay, we got you marked.

CASPER Okay, I'm going to turn off now. It looks to me like at 12 seconds, I still had a barber pole. Let's say I'm retracked. Try again. Oh, wait a minute. That thing was already 15 inches out. That's what it is. Okay.

CAPCOM All right.

CASPER Am I correct?

CAPCOM That's correct, Ken.

CASPER Okay. I just -- my tape -- this dim light 8 -- I had the lights turned out. I didn't see the tapes. You said it was already out. That sort of makes it SIM bay 5 Casper nothing.

CAPCOM And, Ken, before you put away your flight plan away there at that exercise, we'd like to remind you of something here.

CASPER All righty. Go ahead.

CAPCOM Okay, if you want to turn over to 129 25 there about.

CASPER Got it.

CAPCOM Okay. You'll see the right-hand change there that may look funny to you but we really want those steps done and what we're doing is turn it -- the image motion off for that pass and that's why it's a little out of the ordinary.

CASPER Roge. I understand. This is -- the purpose of this was so that they can get a calibration on just how much motion comes so that I can tell the zero points smear comes on the film, is that correct? That's just a gee whiz thing.

CAPCOM Okay, Casp.

CASPER The information "Gee, whiz" to me I guess it's important to the people to have to make maps out of this stuff.

CAPCOM Roge.

CASPER Okay, anything else for I do myself in?  
CAPCOM No, about the only thing I've got, Ken,

is your temperature for the sleep period. I guess there's a couple of things we could do like we could leave some power on to increase the load or we could try to move the temp invalve or we could -- I guess you don't have any --

CASPER I'm sorry. I wasn't meaning to be complaining. I was merely wanting to record or remark to a significant change in the cabinet. Sometimes -- starting yesterday, sometimes, and I don't know when compared to what we have had and that was not something I was asking for relief on. It's very comfortable.

CAPCOM Okay, very good.

CASPER Sorry if somebody put any time on it.

CAPCOM No, it's no problem. We're glad you're happy.

CASPER I thought that it was kind of interesting, and I don't know because I'm in a 60-mile orbit or whether it's because there's only one guy in here adding heat to the atmosphere, and I guess we'll decide that when John and Charlie climb in.

CAPCOM One explanation is that you lost two roommates but also, that cabin ran what I thought a little chilly and -- do you notice it getting a little clammy going through the dark pass?

CASPER Well, it's not doing so bad today. Yesterday, on the dark passes, all the windows were fogging up and every time I breathed, I had to go wipe the window off. It looked like I was standing in front of a pet store, and I haven't had that trouble today at all, and it looks like it's slowly drying itself out. We had an awful lot of condensation in here. It showed up during after LOI. All down into the SIM bay was a great big puddle of water and we had not been aware of any collection of water anywhere before that but it obviously had been there. It didn't come out of the tunnel but it just sort of finally all condensed. And any time you go into clean out the suit circuit return screen, right down in the bottom of that compartment, you can see that there's a -- there's condensation on some of the lines and there's a little moisture on the bottom of the compartment.

CAPCOM Okay, we got those and I'll not talk to you for awhile here so you can have at it.

CASPER Okay. As a courtesy, I'll turn VOX off too.

CAPCOM Okay.

END OF TAPE

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CASPER Hey, Stu.

CAPCOM Go ahead.

CASPER Do you folks have any, if you don't have anything more to pass up on this pass, I'll set my alarm clock to remind me just before LOS, but I'd kind of like to take my comm carrier off during the exercise period if that wouldn't bother anybody.

CAPCOM No, that's fine with us.

CASPER Okay, and I've got my tone booster hooked up, and if you want me send the crew alert and I'll come talk to you.

CAPCOM Okay, we can handle that, and it looks like we have nothing else, and if you come up before LOS fine, if not, we'll see you around.

CASPER Okay, see you in a little bit.

CAPCOM Okay, and if I miss you at LOS, I do want to remind you about, you've got to configure the DSC on this pass.

CASPER Rog, I've got my kitchen clock set for that.

CAPCOM Okay.

END OF TAPE

CAPCOM Casper, Houston, standing by.  
CAPCOM Okay, Casper, Houston. Standing by.  
CASPER Hello there.  
CAPCOM Greetings. You're loud and clear.  
CASPER And so are you. Looks like we had  
extra trouble locking up that time.  
CAPCOM That was -- reacquired with the ground  
station here. It was switch here, Ken, and there's nothing  
wrong with the good ship Casper.  
CASPER Oh, yeah. I was going to chastise  
you guys for that. No, I just happened to notice -- I was  
looking out and I noticed that earth was quite a ways above  
the horizon and I looked down and there wasn't any signal  
strength I was -- got to wondering about it. I don't think  
you guys are sanforized. You're getting smaller.  
CAPCOM Hey, if you've got a couple of minutes,  
at your convenience, I'll give you a tentative master plan.  
CASPER Okay. Let me put some of my toys in a  
nice resting place and I'll be with you.  
CAPCOM Okay. This is not a flight plan update,  
Ken. It's just going to be a general summary of what we're  
looking at.  
CASPER Roge.  
CASPER Let me get this thing set up for the  
photo pass and then I'll -- so I'll be ahead and then we'll  
go into that. Switch banks.  
CAPCOM Roge. At your convenience.  
CASPER Hey, Stu. I noticed that this thing  
tease an awful lot on any sharp sound in the cockpit.  
This is getting annoying. I'll turn the vox level now.  
CAPCOM Haven't been hearing a thing right then,  
Ken.  
CASPER Okay, fine.

END OF TAPE

CASPER Okay, all set.  
CAPCOM Okay. I'll have about 3 flight plan updates for you in a bit too, when you get a chance. But here's the way the plan is looking. We'll have no TC2 on our shaping burn, we'll do PC1 about 3 REV's prior to LM liftoff, which will be about 4 hours later than the flight plan shows. We're showing liftoff of the LM for about 175 44 and in the place of the nominal PC1 time, we'll be doing the bistatic radar. They will have the third EVA. It'll be - they're shooting for about 5 hours on it, and of course, their prime objective is North Ray. EVA 3 and the rendezvous will be done on the same day, and to hold down the crew time, that will make it about an 18 hour day. We'll hold on to the LM through the rest period and jettison the LM the next day. From your standpoint everything will be fairly nominal up until about liftoff minus 6 hours. It will be pretty close to what we're showing in the flight plan now. Of course we'll have some updates as they work the scientific standpoint of it. Oh, and TEI will be approximately a day early.

CASPER A day early?

CAPCOM That's affirmative.

CASPER Any particular reason, I mean - I would have guessed on the other things, but not that.

CAPCOM Well, I guess it goes down into the bit with we skipped the PC2 by considering the Sim bay and the objectives left. Everybody is going to be happy and decide to ship you out around a day early.

CASPER Okay, we're going to launch a satellite from the orbit we're in, is that the idea.

CAPCOM Yes, it'll be the orbit after PC1 and there's no sweat on the lifetime, they're guarantying a lifetime of at least a year and looking to have a fairly reasonable perigee even after a year from the orbit after PC1.

CASPER Okay.

CAPCOM And that's about it, of course all the specifics will be coming up to you and I have 3 flight plan updates just any time you're ready, no sweat.

CASPER Okay, go ahead and copy.

CAPCOM Okay, the first one will be at 130 hours 31 minutes.

CASPER Go ahead.

CAPCOM Okay, we want to delete the mapping camera retract and at 130 34 delete the mapping camera laser altimeter cover closed.

CASPER Okay, delete the mapping camera retract and the cover closed.

CAPCOM Okay, and at 131 19-  
CASPER Alright.  
CAPCOM Okay, your speed on your camera is  
changed to 1/250.  
CASPER Okay, that's 1/250.  
CAPCOM Okay, and just to ease your mind on that  
other note - flight plan note - we're going to - the mapping  
camera will be left out during your dump and the sleep period.  
CASPER Okay.  
CAPCOM Okay, and at 132 hours.  
CAPCOM And Ken, I've got one more at 132.  
CASPER Okay, you dropped out there. I didn't  
get anything, and you just went silent. I didn't hear any-  
thing after - oh let's see, what was the last thing I got  
from you, I got the configuration change in the camera and  
understanding that the camera was going to be left out all  
night, and that was all I heard.  
CAPCOM Oh, okay. It will also be out during  
your dump, I just wanted to verify with you that that was  
true.  
CASPER Yes, I got that.  
CAPCOM Alrighty, and you got the shutter speed  
change at 131 19, and my next change is at 132 when you're  
ready to copy.  
CASPER Okay, I'm ready.  
CAPCOM Okay, we want to add H2 tanks 1 and 2  
heaters AUTO, H2 fans 1 2 3 OFF.  
CASPER Okay, H2 tanks 1 and 2 to AUTO and all  
3 fans off at 132 hours.  
CAPCOM Okay, that's the end of the update.  
CAPCOM And Ken, I've got a few questions about  
the flow of Montostam when you got a chance - you want to  
talk about it.  
CASPER Okay, let's see. I got a few minutes.  
Why don't we talk right now.  
CAPCOM Okay, I'll just run through the 4  
questions, why don't I just give them all to you and then  
I can go back over them, but we would like to know in what  
part of the floor is the flow. We'd like to know how large  
it is. We'd like to know the direction of flow, and on the  
spot observation of whether you think it's a landslide or  
a lava flow.  
CASPER Okay, I covered some of that again on  
this last pass, I guess, let me - say those questions again.  
CAPCOM Okay, and one -  
CASPER I want to write a few key words down.  
CAPCOM Okay, in what part of the floor is the  
flow?  
CASPER Okay.

CAPCOM            Want to know how large it is.  
CASPER            Okay, go ahead.  
CAPCOM            Okay, and what is the direction of flow.  
CASPER            Okay, and your last question was origin?  
CAPCOM            Roger.  
CASPER            Okay, let me see if I can get a map here  
that I can give you some reference on. The kind of flow  
that I'm talking about back there is sort of like the flow  
from - that you see in mare materials. It's not a big thing  
that you can trace back like you can some of these other things  
we've seen. It just sort of appears as a flow front, I'm not  
sure where it comes from and you can see it run down in the  
craters and around them. And from that - I made a little more  
objective analysis of the stuff that you see on this back, this  
last pass when we came across on what we call the farside high-  
lands. And it's my general impression that these flows, maybe  
I'm using the wrong term, they look like flows, they have all  
the characteristics of a flow front, and yet there's places  
where they go along and you'll see - with a scarp going  
down to the east and all of a sudden it'll get a little con-  
fused and then the scarp will be showing up going to the west.  
And then you'll see places where - there's one place in  
Mendalstam, I think we have a picture of it, where this  
scarp that looks like a flow front, curves around in an arc  
to the right, and it's got material that comes from behind it  
and also it sort of turns back in underneath itself and then  
it just disappears. There's no flow front where it disappears  
underneath, it's just a very strange thing. We see that in  
several other places. A similar appearance is in the photo-  
graph that Faruch and I were looking at of Bohuenberger. It's  
on a much larger scale, of course, but it's the same kind of  
a problem, where you see a unit where it is obviously over-  
laying another, and yet it's overlaying itself by one - the  
original unit happens to overlay. It's like a chain where  
each ring overlaps the other one on a closed circle. And  
it's very confusing from that point, and let me look at my  
map here and see if I can give you some better handles. I  
think I took some pictures back there to mark it.

END OF TAPE

CASPER                    Okay, Stu. It looks like the map is no help, and the only picture we have onboard that I can talk about is in the visual photo book. It's V-1A, and if you look at the - remember Mendelstan has the big central crater and then two little craters, or kind of looks like Concentric craters with a bulls-eye, and the flows that I was looking at, were almost on the - I guess that you could say, on the northern side of the big crater, and they run down into several of the smaller craters up there. And the general direction was with the flow scarp, and I'm calling it, facing the, facing to the west and runs into the crater on the northern side. That's, after looking at more and more of this highlands back there, I'm beginning to believe that these are not actually flow fronts at all. They just happen to look like that if you look at them in short sections. But I think there must be some other process that effecting all this.

CAPCOM                    Okay.

CASPER                    But, I'm afraid that the specific kind of questions you asked, in this case, I'm really caught out to lunch. I can't make specific things when you say how large. They're, the length of these things that I can trace are the same size as, as the crater that I was looking at, and I guess that must not be that central one, but one of the adjacent ones. One of the ones on the north. But they're quite long, and they're all of the area. They're in craters and their outside of them. They're on the floors. You see these things just about everywhere you look back there. For origin, they're just, it sort of defies my imagination. I see nothing that looks like sources anymore.

CAPCOM                    Okay, we got that.

CASPER                    I guess that's, I guess that's a brief summary to say that I'm really not as smart as I wish I was.

CAPCOM                    That sounded pretty good to me, Ken. And we'd like HIGH GAIN to AUTO.

CASPER                    Okay, there's AUTO. Now, gamma ray shield off, ah ha. And it's off.

CAPCOM                    Okay.

CASPER                    And, I'm going to start in on my strip here. And just for planning purposes in the future, I know we've got those templets out, and when we looked at all those templet on the chart we said "Gosh, you know you must be able to see a lot more from the window", but photo targets like this one are in the extreme of what you can reach from our window. I guess they really didn't, they didn't exaggerate those things too much at all. You can see more if you put your face right against it, but by the time you get a camera in there, your field of view that you can control the camera in is greatly reduced.

CAPCOM                    Okay, is it true of the hatch window also Ken, you know that's the one we talked about that looks like you're bound to be able to see more -

CASPER                    Yea, it's not as true there, because you

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CASPER            have, yea, you can certainly see more and you can, you can get around it with the camera a lot better than you can with these sides. You run into, you bang your head against R12, and you push it into the comm panel and there's always something where you want to put your head.

CAPCOM            Hey, I agree with that. I've been in that same corner with the 500.

CASPER            (Laughter) Yea, one of those folded kinds would be very nice, but even that, I - in looking at it, I was holding my 250 against the window here with the increased diameter, you'd buy a little bit with that folded one, but not a terrible amount cause the darn diameter is going to bit you. When you look at anything other than perpendicular to this side hatch window, the two window panes are so thick, that you can't look very askewed.

CAPCOM            Okay.

CASPER            Okay, we've started our photo strip.

CAPCOM            Okay.

END OF TAPE

CASPER                    Okay, that's a good place to quit, and that's frame 61 on Magazine Papa Papa.

CAPCOM                    Okay, Frame 61

CASPER                    Yes, sir.

CASPER                    Okay, the image motion has stepped up to the barber pole and back to OFF.

CAPCOM                    Okay.

CASPER                    And the gamma ray shield is back on.

CAPCOM                    Okay.

CASPER                    I'll tell you, Stu, that straight wall really is a hummer out there.

CAPCOM                    Sounds awful beautiful, Ken.

CASPER                    Yeah, and all the things that are on the front side, I'll have to admit that in many respects it's more interesting. I'm not sure that there's any more to be seen or learned here, but it's -- there's enough extra variety and it's easy to recognize it's something that's different. You don't have to look so hard to see what's the same. When I looked down at the individual sections of material, I looked at this Cayley down here and by looking at the total mass -- Alphonsus -- the floors that Cayley filled, it looks just the same on the detailed scale as the stuff on the backside does and the rims around the craters like Alphonsus, that material looks just like the stuff on the backside. When you get down to the detailed level, it all has the same features on it. The only thing that I see that's quite a bit different is that I don't see any of these real systems on the backside anywhere.

CAPCOM                    Okay.

CAPCOM                    Maybe we can talk to Fido and working up something while you disorbit the front side.

CASPER                    Yeah against one of those synchronized kinds.

CASPER                    I'm looking down here now at the area just to the west and south of Lassell seat, one of those highlands there, and if you go straight south from Lassell, there's a little tip of a highlands material that runs out to the west then stops and then if you think from there draw a line, I would guess it's almost due west. It looks like there's two entirely different materials there like you'd built it out of two fabrics and then put it down. The one to the north is darker than the one to the south. It's split by a very straight line, and there's a very distinct difference in the albedo or the shade of gray that the mare has.

CAPCOM                    Okay.

END OF TAPE

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CAPCOM                   And Ken you're under 1 minute to mapping  
camera off.   You've got about 45 seconds.  
CASPER                   All right sir, thank you.  
CAPCOM                   Okay, you are ten seconds, T stop.  
CASPER                   Thank you. And it is stopped.  
CAPCOM                   Rog.  
CASPER                   Okay, I'm at standby.  
CAPCOM                   Okay.  
CASPER                   And the laser is off mark.  
CAPCOM                   Okay.  
CASPER                   Okay, and the alpha X-ray cover is coming  
closed. Mark. Barberpole and gray.  
CAPCOM                   Okay.

END OF TAPE

CAPCOM                   Okay we've got.

CASPER                   Okay I guess I'll torque these. Although  
it seems like a shame.

CAPCOM                   Yes we see them and go ahead and torque  
them. Oh that beauty is nice.

CASPER                   It really is. Hey Stu, none ever said  
anything about the P23's. Anyone in the back room know how  
they came out? What kind of an altitude we ended up with?

CAPCOM                   Yea Ken, we've got that. I looked at  
it there a couple of days ago. A little blurb they had written  
here says the mark data was real consistant and I think it  
was something like 33 kilometers, but let me check that out  
for you.

CASPER                   Okay I'm just curious. I didn't feel  
like I had as much trouble with that horizon as I anticipated,  
as far as knowing where I'd oughta be. My problem was getting  
the spacecraft there.

CAPCOM                   Ken, I remember your comment here yester-  
day about the sextant and the telescope really looking swing-  
ing. Do you have any change in that at all? And particularly  
the reticle on your sextant. How's that look to you and  
how's the lunar surface look through the sextant? These are  
just all my own personal questions. So don't take much time  
on them.

CASPER                   Rog. Right I -- yea I -- No as a matter of  
fact at one time I looked in there and saw the sextant was really  
blurred and I thought oh here we go, just what you said.  
And I got to looking around and I found that these eye pieces  
vibrate on there quite badly. And I guess I shouldn't use  
vibrate badly, but they unscrew and I've got a lot of tape  
wrapped around them now to keep them on. And they change  
focus and I had to refocus the thing. (music) And once I  
got it focused it's -- if I turn the reticle lights up to  
full intensity why I get a little bit of a smear, but not  
much at all. When I look at the images on the ground,  
like in the tracking, I took a look during the practice track-  
ing period and boy I tell you that was just as nice -- the  
only problem when you're down low and looking through that  
28 power your field of view is so small you wouldn't  
recognize your own house if you flew over.

CAPCOM                   Rog. Copy.

CASPER                   I still -- I'm still not having as much  
success with the telescope as I -- as I ought to and I'm  
trying to psych it out. I was going to try to take a look  
here a couple of times. I'm not aware of any light in the  
telescope right now, but you just can't see any stars in  
there. And I'm wondering if the earth is enough still that

CASPER                   it might blank them out. Because they're obviously there when I look out the window, but they become a great deal more obviously once I get on the back side or in that double umbra. And I thought I'd try to make a note to check that in the telescope on this pass. I know when the LM was on the nose that really made a big difference, because all I could see was LM.

CAPCOM                   Hey, I agree with that you get a very good picture of the LM clod.

CASPER                   Yes, I can see the clod in the radar. I can tell you all about them.

CAPCOM                   Rog.

CASPER                   But even in earthshine it was -- it was -- you could -- you could pick out all the features in earthshine. It was really amazing. It was just -- just beautiful. And last night, or whenever it was when we were playing around there, why if I had a little more confidence in depth perception we could have done our station keeping without any lights or earthshine. You get -- once you leave earthshine through you really need that old docking light. And the docking light much of my surprise isn't good for much outside of 500 feet and at 500 feet if you ever lost sight of the target you probably wouldn't pick it up again. Until you get into 300 feet then, then it holds the target and space illumination to see things and tell relative motion. I didn't turn all the cockpit's lights down too dim because the LM strobe is such a beauty. And finally we turned the strobe off just to save power and time on it. And we had no problem at all, but the -- I'd pass the LM guys how bright that thing was in their face, but I had the impression that it wasn't so terribly bright.

CAPCOM                   Okay. Thank you.

CASPER                   Got another little piece of amazement here that you'll -- you might appreciate. It took me by surprise. I did it -- I started on my check -- the GE -

END OF TAPE

CASPER                    Got another little piece of amazement here that you'll -- you might appreciate. It took me by surprise. I started out and I checked the GDC drift when -- right after we got on our way and they were running pretty hot, they were about 7 degrees an hour, if I remember right, I got it written down somewhere, I won't look for them now, but maybe it was like 6 degrees but they were pretty drifts cause this was sometime after I got -- I checked one set of B banks before TOI and one after, and I did a GDC align at a 127 hours. I just did another one. This is a 130 45, so that's 3 hours and 45 minutes and the two were off by 2 degrees in roll, 1 degree in pitch, and 3 degrees in yaw, and that's the way this thing has been operating for the last couple of days, and I don't know what finally got into to square itself away. At the time the platform went dilly up there, why, they were about 12 degrees apart and they had been alined probably no more than a couple of hours before that, and I noticed the following day, I started watching the GDC and I noticed I didn't have to aline it very often, and it just seemed like the more it runs, the better it gets.

CAPCOM                    Hey, that sounds jolly good, Ken. I had suspected that you had been keeping a rather close eye on the GDC.

CASPER                    I tell you, every time I zero the optics, I think about 50 checks pulling the switches in here.

CAPCOM                    Rog.

CASPER                    Do I have your attention?

CAPCOM                    Rog. I suspect that the GDC stays pretty well alined too.

CASPER                    Maybe you know something that I don't.

CAPCOM                    Roge.

CASPER                    Something else has surprised me, Stu, maybe you remember. I can see a definite horizon for the moon within a minute or so of LOS, and I guess, that's the diagonal light of the solar corona showing up there, but I really didn't anticipate seeing that nice dark disk, and there's -- it's just like seeing the earth horizon on a dark night. It's really there.

CAPCOM                    Okay, Ken. We got that.

CASPER                    Do you remember seeing that much horizon?

CAPCOM                    No, I sure didn't, Ken, but I had very few passes where the orientation was where I could see that.

CASPER                    Yeah, I understand.

CAPCOM                    And, Ken, we're about a minute and a half to LOS.

CASPER                    Okay.

CAPCOM                    And I want to remind you to configure

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CAPCOM           that the FE on that --  
CASPER            Okay, thank you very much.  
CAPCOM            Tally good, we'll see you in a little  
bit.  
CASPER            All righty. Have an extra cup of coffee  
even you don't drink the stuff, I need some.  
CAPCOM            Okay. I might try to even drink coffee  
for you, Ken. How about that except chocolate.  
CASPER            Well, we probably both want the same  
thing right now.  
CAPCOM            Rog.

END OF TAPE

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CASPER Hello there, Stuart.

CAPCOM Hello, greetings, Casper.

CASPER I just took another look at our old friend King, looking at him this time from the north looking south and west and there's no question in my mind now that there definitely is some dark material that's on the top of the central peaks that's on that western side, before I couldn't really tell if there was and it looked like there was some blocks that might be casting shadows, but looking back at it there is something on there that at least changes the albedo and nothing else, and it's not shadow and I've got a picture here on famed Victor Zona hopefully will substantiate that.

CAPCOM Hey, that sounds jolly good.

CASPER GARBLE stand and took another look at the craters we talked about and there are two places in there where I think I see these close garbs that I was talking about. And one of them is at - let's call it 163 degrees east and about 2-1/2 degrees south, and you see a little blob that the artist has drawn in there and that looks like that's part of what I'm looking at appears to be in the GARBLE, kind of like a probe deal.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 09:18 GET 141:35 CM102/1

CAPCOM            Good morning, Casper.

END OF TAPE

CAPCOM Good morning Casper, you stirring around  
yet?

CAPCOM Casper, Houston.

CASPER Hello, there.

CAPCOM Good morning. Did you have a good night?

CASPER Yes sir.

CJPCOM Casper, Houston. We show you in CMC 3.

CASPER Thank you.

CASPER Okay, and the gamma ray shield is off.

CAPCOM Roger.

CASPER And the pan cam power is coming on. Mark.

CAPCOM Roge. Go ahead.

CASPER Okay, Bravo 15 051. Bravo 3 6-1/2.

Bravo 4 negative. On the chow. Meal A had scrambled eggs and orange juice with potassium. On meal B had coffee, orange drink with potassium and a beef steak. Meal C delete the frankfurters add turkey and gravey and coffee.

CAPCOM Okay, we got it. And Ken your consumables were just about back on a nominal for the cryo and the RCS is 150 pounds above red line.

CASPER Okay, that's sort of holding it's own, isn't it.

CAPCOM Roger, and if you'll give us ACCEPT, we'll get your tape vector up.

CASPER You've got it.

END OF TAPE

CAPCOM And Casper, we're clear for power off on the pan camera.

CASPER Okay, power's coming off. Mark.

CAPCOM Ken, I got some words of the SIM bay status. Do you want to listen?

CASPER Okay, fire away.

CAPCOM Okay, the mapping camera is working real well, except for that extension problem. We're, have a margin of 203 frames. The laser altimeter is still degrading. We're down to where we're getting about 70 percent of the good altitudes, 30 percent of the time it's fouling up. Pan camera is over exposing the film but we can process a great deal out of that out, however, we loose some resolution. We're 58 frames ahead on that. The mass spect is purking along real good. No immediate evidence of PURGES or water dump in the data, and we've got that retraction problem that you're aware of, where we'll leave it out except for burns, and the gamma ray spectrometer is doing excellent work. We've got good peaks for thorium, silicon, and potassium and the X-ray and alpha particle are nominal.

CASPER Okay.

CAPCOM And the computer's yours.

CAPCOM And Casper, Houston. I have got some flight plan changes for you.

CASPER Okay, go ahead.

CAPCOM Okay. The first one is at 142 hours.

CASPER Alright, go ahead.

CAPCOM Delete the charge battery A.

CASPER Okay, that's deleted.

CAPCOM Okay, at 143:15 -

CASPER Go.

CAPCOM Delete the VERB 48 load.

CASPER Okay, VERB 48 is deleted at 143:15.

CAPCOM Okay, at the same time 143:15, we want to add P20 option 5 minus X forward SIM attitude. Maneuver completion time of 143:32. Your NOUN 79 is 3°. Set HIGH GAIN.

CASPER Okay, at 143:15 it will be option 5 minus X SIM bay, NOUN 79 3°, 143:32 is maneuver completion time and I would guess the HIGH GAIN ought to be about 0 and 170.

CAPCOM That's affirmative, and immediately following that, we want to go to the CSM experiment EVA check list. Gum nebulae into the photo sequence B, page X 2-8.

CASPER Okay, then we do, get ready for the Gum nebulae sequence B on page X 2-8.

CAPCOM That's affirmative. This will give you some warning here, because after your eat period, it's probably not enough time to get that before you have to start it. Okay, at 143 -

CASPER Okay.

CAPCOM 143:35 -  
CASPER Yep.  
CAPCOM Acquire MSFN with a, the manual Y 0 and 170.  
It just changes the angles you've got. Normal acquisition S-band  
greater than one half scale you know then react now.  
CASPER Roger.  
CAPCOM Okay, at 144:15 -  
CASPER Okay.  
CAPCOM Go to P00 then VERB 49 maneuver to DSM, that's  
dup space measurement slash Gum Nebulae .2 attitude, and the  
attitude is 305 136 298, and the maneuver completion time is  
144:25.  
CASPER Okay, at 144:10 I want to go to P00 VERB 49  
DSM/gum nebulae .2, the attitude 305 136 and 298. Maneuver  
completion time 144:25.  
CAPCOM Roger, and that was to be accomplished at  
144:15. And at 144:30 -  
CASPER Yes, sir.  
CAPCOM It calls for a P52. We want to move that  
back to 144:26.  
CASPER Okay, you want to do the P52 as soon as  
the maneuver is completed at about 144:26.  
CAPCOM That's affirmative. Right in there as soon  
as you get into the dark and could you give us the gamma ray  
shield on now.  
CASPER And, the shield is on.  
CAPCOM And HIGH GAIN to AUTO.  
CASPER You have it.  
CASPER Okay. At 144:30, it's time to start the  
dup space measurement, the gum nebulae, and at 144:31,  
gum nebulae photo sequence B. Page X 2-8.

END OF TAPE

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CASPER                    Okay, and how long does that thing take,  
Hank, that's about -  
CAPCOM                    Okay, the gum nebula, I mean the deep space  
measurements start at 144 30, the gum nebula photo sequence -  
if you want to build you a little tape there, they should run  
from about 144 36 to 144 50.  
CASPER                    Okay, that's 144 36 to 144 50.  
CAPCOM                    Roger. That's when the photos are going  
and you're getting deep space measurements all the time that's  
going.  
CASPER                    The beep space business, I don't have to  
do anything.  
CAPCOM                    That is affirmative, Ken.  
CASPER                    Don't have to do anything during that  
time though, is that correct?  
CAPCOM                    And at 144 35, of course, delete that  
verb 49 maneuver.  
CASPER                    Roger.  
CAPCOM                    And Ken, that gets us through the next  
REV. I've got a few more changes, but if you like, we can  
wait till the following REV to read them up.  
CAPCOM                    You're coming up on (garble) time now.  
CASPER                    The stuff that comes up right at - okay,  
the stuff I have to do between the time I have LOS and the  
time I pick you up again is still good so why don't we just  
put it off and let me get going on my gegenschein.  
CAPCOM                    Okay.  
CAPCOM                    Ken, we understand that mag ZZ is in the  
Nikon and FAO says they ought to have plenty of film to do  
the gum nebula.  
CASPER                    Okay, fine. Thank you sir.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 09:54 GET 142:11 CM106/1

ALL DEAD AIR

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 10:28 GET 142:46 CM107/1

CAPCOM Casper, Houston. No need to acknowledge we're about 2 minutes from LOS, all your systems are looking good. Just a reminder to figure your BSE to half bit rate record for command reset at LOS.

SC Okay Hank. I copied you on the (garble) thank you.

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 11:14 GET 143:32 CM108/1

CAPCOM Casper, Houston.  
CASPER Hello, there.  
CAPCOM Hello, how did everything go on the back.  
CASPER Oh, we got a lot of very dim photographs.  
CAPCOM Roger.  
CASPER Actually we got them all in. Times worked  
out just perfectly.  
CAPCOM Okay, I'll get you SIM report whenever you're  
ready, and when you -  
CASPER Only, ah - Okay, let me give you that. I just  
was turning the page. I did have one comment on the first frame  
on that antisolar sequence. I think it's probably not part of  
the gegenschein experiment itself. I think it's more zodiacal  
light business, but it's a 5 minute exposure and we took it with  
the spacecraft say my heads down, and nearly in a local horizontal.  
The camera was pointing 30° down and it looks to me like it would  
went ahead and moved in earthshine, in the field of view. So I  
suspect that's not much of a, not a very good frame. The rest of  
the sequences went fine, and the pointing attitudes pointed us  
right into places on the chart. And I have attitude errors on  
the antisolar sequence, I'll just give you the attitudes at the end  
and we started from the proper attitudes. It was 165 257 and 354.  
The second part of step 4, was 167 258 and 357. The attitudes in  
step 7, 169 264 and 0. The attitudes in step 10, 164 275 and 359.  
Magazine Zulu-Zulu has has 15 exposures taken.  
CAPCOM Roger, copy, Ken.  
CAPCOM And, Ken. Whenever you get a break there in  
your eating period, I got the rest of your flight plan changes.  
SC Okay. Let me get a couple of bags ahead here.

END OF TAPE

CASPER                    Hey, Hank, a little curiosity here that - I guess it's just gee whiz, I've been noticing some things like I've got 2 leads tied to the G&N handrail, and I've got a pair of scissors strapped down here in the LEB on a tether, and I've got a trash bag up in the tunnel. Most things in the cockpit give you troubles with floating around. Really, you've got to pay attention if you want it to be stable. But the trash bag never leaves the tunnel. And 2 leads, every time I've looked at it, has been pointing - its been hanging up instead of hanging down as you would think, in the CMS. And my scissors are generally up and I have decided that gee, that's my imagination, that can't really be. There's no preferred direction. And I got to thinking about the thruster configuration we have given us, the all minus X thrusting, whenever they do fire for attitude control, and so I thought I'd take a look here while we were in attitude hold, and sure enough in attitude hold, the 2 leads didn't go up and the scissors do stay down, and I guess that was when we were free most of that time rather than in attitude hold. Apparently, you can see the effects over a long period in the cockpit of the minus X firings for attitude. I thought that was kind of unusual.

CAPCOM                    Yes, very interesting.

CASPER                    And let me get a bag open here and I'll be ready to copy while I am drinking.

CAPCOM                    Okay.

CASPER                    Okay, go ahead.

CAPCOM                    Okay, Ken. The first change we want to look at is at 145 14.

CASPER                    Hank, if we're going to do this during this actual eat period, the best thing for us to do is probably for you to read them very slowly and I'll copy all I can and when we get to the end, I'll read them back to you.

CAPCOM                    Okay, at 145 14, this is a minor change, in that mapping camera photo pad. The longitude there where it says 159.9 to 20.7 degrees west, that should be 23.7 degrees west, and this is just for your own information, and that's 2-1/2 REVs.

CAPCOM                    Okay, the next change is at 146.18 on the next page at 146.17 really, where it starts there with gamma ray shield off. Delete from there through image motion off, that's delete gamma ray shield off, mapping camera off 2 stop, wait 30 seconds, mapping camera standby and image motion off. At 146-24 there, where in this block for mispent update, we won't be giving you a mapping camera photo pad, instead it will be a pan camera photo pad, this is just for your information, and it'll be copied at 148-10.

CAPCOM                   And Ken, we need high gain AUTO, and we'd like to verify the position of the DSE recorder switch.

CASPER                   Okay, you've got AUTO and the DSE is in record and forward high bit rate.

CAPCOM                   Roger, copy. And Ken, the next change is at 146-27. We want to delete all the little business there with the gamma ray, gang step on up 4 step, step 7 shield on antenna, delete that whole line. Okay, the next change is 146-30 at the top of the page. This is a minor change, the film experiment status should now be plus 1111 and 02222. And if you flip the page over at 147 hours their SIM status should be the same as before plus 111102222. At 147-12, delete image motion ON, delete mapping camera ON T start, and also delete that block for the photo pad, mapping camera photo pad. Okay, on the next page at 148 hours, right at the top of the page we want to add, gamma ray retract to 7-1/2 feet, the time for retraction is 2 minutes 26 seconds. At 148-05 add: Pan Camera standby, stereo power verified, Pan Camera operate at P start. And Ken, somewhere out beside that, you can build you a little block if you like, to copy the pan camera photo pad.

END OF TAPE

CAPCOM - come around to 5 DAPS you can build you a little block, if you like to copy the pan camera photo pads.

CAPCOM At 148:17, add pan camera stand by, at T stop. Pan camera off. MSFN cue, and gamma ray deploy.

CAPCOM At 148:29, where it talks about gamma ray gang step et cetera, delete the middle part of that so it reads gamma ray gang step on center.

CAPCOM That should be shield on.

CAPCOM To repeat, that should be gamma ray gang step shield on center. And right under that, at 148:30 there, delete map set retract to 8.4 feet.

CAPCOM At 148:30, at the top of the next column, the SIM status should be plus 1111 02222.

CAPCOM At the top of the next page 149 hours, SIM status code should be the same as before plus 1111 02222.

CAPCOM And at 149:18, the block there that refers to pan camera stand by stereo power operate T start. That little group, this is a note. Do you see how it should be moved up. Says that the T start that occurs at 149:16.

CAPCOM At 149:30, the SIM status code should be plus 1211 22222.

CAPCOM And, Ken. That's all of them for now.

CASPER Okay, Hank. Let me read them back to you and I'll just start, start back here. The last one you gave me at 149:30, we got the status code as 1211 and 22222. We move the pan camera block that's now at 149:18 up to a point where the operate comes at 149:16. SIM code on that page is, is 4 sticks and 04 duces. Same status code on the top at 148:30, 148:29 is gamma ray gang step on, or shield on. 148:20 is gamma ray deploy, and at about 148:17 it's pan camera stand by at T stop, and then off at MSFN command. 148:15, it's pan camera stand by stereo power and then operate at T start, and I've got a block ready for T start and stop. At 148 even, it's gamma ray retract to 7 and a half feet. That's 2 minutes and 26 seconds from full retract, from full extension end.

CASPER I've deleted the mapping camera pad at 147:15. I've deleted the block mapping camera at 147:12, oops, except for the image motion increase, which still goes in there. I've got a status change at the top of 147. The bottom line is now 02222. 146:27, we delete the gamma ray line. Big change at positions of the pan camera photo pad to 148:10. Deleted the little block of items starting with gamma ray shield off and ending with image motion off at 146:16. And the mapping camera photo pads, 145:12 is 2 and a half REVS and ends at 23.7 west.

CAPCOM Okay, Ken. That all looked good except at 148:30. We wanted to make sure you deleted the masspect retractions.

CASPER Yea, sure did. I'm sorry. I just (garble) step line.

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 11:34 GET 143:52 CM110/2

CASPER Yes, I'll leave the masspect out.  
CAPCOM Okay, that's a good readback.  
CASPER Okay, Henry.  
CASPER If you don't have anything else for a couple  
of minutes, I'll go back to feeding my face.  
CAPCOM Go right ahead. I won't bother you.

END OF TAPE

CAPCOM SAO capcom, is the TCA time in the flight plan pretty good.

CAPCOM I was on the wrong loop, Ken. I was just checking a time for TCA to Descartes, and it's pretty good whats in the flight plan. John and Charlie are on their way up to Stone Mountain out of CINCO. Their about half way there.

CASPER Outstanding. Did they, halfway up to Stone Mountain, or halfway to Stone Mountain.

CAPCOM They just passed Survey Ridge.

CASPER Okay. Was that real obvious to them.

CAPCOM Yes, it was, and the suprising thing is, that they have no trouble recognizing when they are on a ray. It's very obvious to them on the surface.

CASPER Is that right. What looks different when their on it.

CAPCOM It's just an enormous amount of blocks, and just the way the terrain is all turned up and then they call tell this stuff has been thrown on top.

CASPER Beautiful.

CASPER Ken, the guys are on the first one of those terraces there, they have just passing station 5 now, and they were able to recognize the ray, just by the block count.

CASPER Okay (garble).

END OF TAPE

CASPER Hey, Henry. How do you read Casper now?  
CAPCOM Reading you 5 by 5, Ken. How me?  
CASPER Oh, loud and clear. I guess you probably  
didn't get my comment about the glint over on Stone Mountain.  
CAPCOM Negative. I haven't heard anything for  
a while. I gave you a call a while ago to tell you where  
they were.  
CASPER Okay, and I answered you, and I guess I  
went on VOX, I just realized. Just as you said that, I had  
just gotten in a position as I passed overhead to the area,  
and I was taking a look at it, and I had 2 things in mind.  
One of them was to inspect by the landing area and I got  
there to late to tell whether I had seen any of that. And  
then, the next thing I did was to look over toward the ter-  
races and see how they looked today and I looked over towards  
the terraces and it was kind of strange because I was looking  
around and I'd say, maybe you could see at this sun angle  
like there might be a terrace out there, and you can see Crest  
crater very plainly, and the Cincos, you have to be - I have  
to be on top of the landing site to see it, and by the time  
I got around to that, I was downstream a ways. But I got a  
flash of light right at the base of Stone Mountain, just a  
glint like a piece of metal flashing in the sunlight. I'll  
betcha anything, I got a reflection off the Rover, if at about  
that time they were right at the base of Stone.  
CAPCOM That's about where they were, Ken. It's  
about time to start your V49 manuever.  
CASPER Okay, thank you.  
CAPCOM And John called me up there, they're at  
Cinco.  
CASPER Already.  
CAPCOM Yes, they're making good time.  
CASPER It doesn't seem possible they could go  
that fast.  
CAPCOM Ken, you might keep your eye on your middle  
gimbal angle on that.  
CASPER Oh, okay.  
CAPCOM And I need to get you your mapping camera  
photo pad up there before we get too involved in this gum  
nebula thing.  
CASPER Okay, go ahead.  
CAPCOM Okay, this is to be copied at about  
145-12. T-start is 145 -  
CASPER Got it.  
CAPCOM 1840. Key stop 1501605, and the image  
motion change as called in the flight plan are good.  
CASPER Okay, D-start 1451840, stop 1501605.  
CAPCOM Good read back, Ken. I won't bother you  
anymore, while you're setting up.

CASPER                   Okay, one other thing I wanted to tell you about in the Descartes area. You remember the little cone shaped thing that we looked at on the plotter.

CAPCOM                   Roger.

CASPER                   It's to the north and mostly to the west of Knub.

CAPCOM                   That's affirmative.

CASPER                   Okay, well I've looked for it on 4 REVs now and I identified the feature that it looked like it was and it doesn't look like that at all. Just a little soft mound with a crater in it, and it doesn't look any different then all the other craters when you look at it from here.

CAPCOM                   Well, that's interesting, but disappointing.

CASPER                   Yes, I was too, and actually, that's about the same score for the one that's out here by Lassell.

CAPCOM                   Oh, is that right?

CAPCOM                   In the photograph for that one there, northwest of North Ray, it sure does look like it had a lot darker material around it.

CASPER                   Yes, I know it does and I haven't had a chance to look at it straight down, but it - from a blank it sure looks the same as all the rest of things around there.

END OF TAPE

CAPCOM                   And Casper, Houston. When you get out to do that P52 and go to SCS, ah, G&C suggest that perhaps you ought to picture that close to gimbal lock. That middle gimbal line or you might go minumum dead band and uncage the B mags.

CAPCOM                   And a low rate on that, too.

SC                        Okay, that's not a bad plan.

SC                        Okay, and I've got a 405 here, Hank. Will that go away if I wait another minute.

CAPCOM                   That's affirmative.

SC                        You say affirmative on that.

CAPCOM                   That's affirmative, Ken. You wait a little bit a head. Star 12 and 13 should be available.

SC                        Okay, 7 and 13, thank you.

CAPCOM                   That's 12 and 13.

SC                        Okay, 12 and 13.

END OF TAPE

SC Al, there's -- that's interesting. There's nothing in the sextant at all. And the telescope, I still haven't been able to pick up the star patterns in.

CAPCOM FAO is checking into it, Ken.

SC And I have nothing on Star 13. I'm going to press on with the Denebola and see if I can catch this later.

CAPCOM Okay, Ken.

SC I suspect we got something like the moon in front of those stars.

CAPCOM Ken, maybe you can get that P52 after you've been to Denebola.

SC Roge. That's what I'm going to try.

SC Yeah, I've -- I looked outside here, Hank, and I got the optics pointing at the moon.

CAPCOM Roger.

SC Yes, as a matter of fact, I'm going to have to wait awhile here just to clear the moon. It think this has got Denebola sequence.

CAPCOM Roger. You should be clear according to flight plan about 36 after.

SC Are you sure somebody verified that these long exposure times we're taking are going to be satisfactory when we've got a brightly lit moon in the field of view? And we looked at all this kind of stuff on the original when we started coming back trying to -- these things in here on real time. I wonder if some of those things need to be verified.

CAPCOM Roger. FAO is checking and this was the PI request.

SC Okay, I -- we'll go ahead and take them, but you ought to be aware that I got a beautiful earth lit moon out here. I just passed -- I believe that's Rima Ursullas and you know, you can see features not as good as the first night but boy, they're still a real big obvious figures out here.

SC At least the star patterns all check out. I've got Canopus and Regor and Atrair and all those stars in sight.

CAPCOM Well, that's good.

CAPCOM Casper, Houston. FAO advises that they'd like for you to wait the LOS to do the photos.

SC Okay, understand that you want to wait till LOS. Okay, that'll ought to get us a little darker scene.

CAPCOM You might be --

END OF TAPE

CASPER None, the less. Okay, that ought to get us a little darker sheen.

CAPCOM He might be pressed to get that P52 in there after that but we'll just have to do the best we can.

CASPER Well, I'm not sure you going to get a P52 in there either, Hank seems to me like I'm supposed to go to a north of flight photo attitude.

CAPCOM That's affirmative and why don't we just go ahead and scrub it -

CASPER (garble) just to make that thing - That's what I was just going to suggest, good plan. And I'll catch 52 the next time we get in the dark, because the platform obviously knows where it is, so we'll go ahead and get this north of flight in here and I'm going to have it looks like that maybe a tight one too, just to get to it but we'll get there if we have to use a higher rate.

CAPCOM Roger.

CASPER Hank, you asked me earlier about the configuration of the DSE switches, was there some problem the last time I reconfigured?

CAPCOM Inco had some data that showed it wasn't in record and he was puzzled about it.

CASPER Well, I see I'm suppose to configure it again in just a minute do you want me to cycle things or anything like that?

CAPCOM Ken, Inco's going to take care of it this time, we would like for you to verify though that you are in the proper configuration, at this time that we thought that you'd be busy taking all of these pictures here, I told him to go ahead and configure it at this end so you wouldn't have to mess with it.

CASPER Okay, I'll just verify it then.

CAPCOM And oh another check, Inco verified there was no problem with your configuration.

CASPER Okay. I may be mistaken, Hank, but I believe that I can see the outer two rings of Oriental now. I'm just coming up on the Earth-side terminator and I can see a big circular basin that's really a big guy, fills the whole window. I can see reflections off the far rim and off the near rim and I've got two concentric rings with some flat area some little build ups in it really looks hilly in there. That's a spectacular sight, which we could see it in daylight.

CAPCOM Roger.

CAPCOM Okay, Ken, we're about 4 minutes from LOS everything's looking good down on this end and just to pass on something about the guys on the surface, they got a real good view of South Ray from where they are they say that - that the crater the ejecta from South Ray is two different kinds of material. There's some dark material and then a light material that we call ray material so he said there's other

CAPCOM               ejecta right along with it in all directions  
but it there's dark and light.

CASPER               How about that? I think I told you yesterday  
that - that it appears to me that the interior of North and  
South Rays are significantly different.

CAPCOM               Roger.

CASPER               South Ray shows a great deal of dark and  
light splotches and North Ray just doesn't show that real  
dramatic difference.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 13:14 GET 145:32 CM116/1

CAPCOM Casper, Houston.

CASPER Hello, there.

CAPCOM Hello. Did you have a busy REV.

CASPER (Laughter) Yea, that was a little tight.

I went to a half degree persecond and we made it. Seems like I had somethings that I needed to bring you up to speed on. Let me see if I can findout where I wrote them down.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 13:24 GET 145:42 CM-117/1

CAPCOM	Casper the computer's yours.
CASPER	Okay, thank you.
CAPCOM	Casper we're ready for power off on the pan
camera.	
CASPER	Okay, I'll get that in just a second. Okay
the power's off.	

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 13:34 GET 145:52 CM118/1

CAPCOM CASPER you're awful quite.  
CASPER Yea I'm doing a little housecleaning.  
CASPER Roger. And I here your radio running  
while you're doing it.  
CASPER Oh yea. This ones kind of appropriate.  
Are you familiar with Mr. Holtz's Sweep the Planets?  
CASPER No I'm not.  
CASPER Well it seemed like that was an appropriate  
thing to bring along.  
CASPER Roger.  
(Music)

END OF TAPE

CASPER You know, Hank. You wouldn't think you loose something in only 12 feet. Right now, I probably got more things lost than I've got found.

CAPCOM (Laughter) Roger.

CASPER Somewhere I lost the ring site that goes on the TV camera and the Hasselblad. And it's probably where ever I put it. And unfortunately I just don't happen to know where that is. I guess that really the only piece of operating equipment that I have misplaced, and that's pretty good considering the shambles that this place generally stays in.

CASPER It's really puzzling. I've been setting here, one of the reason I'm not saying an awful lot, is I'm trying to get some kind of an idea in my head as to, how you would describe the differences between the front and the back of materials, and that's really hard. Does everytime you look for a objective thing, you really kind of find that there's alot of similarities, when you get down to the details. It's not clear that the backside is, would be that much different from the front if we'd put a few mare's in there and a couple of the big rilles. One of the things I noticed about most of the craters on the backside are the larger ones. Even the ones with the steep interiors do not have any kind of a block or (garble) around the outsides. I should say none, but it's very seldom you have to stop and look for each block. But there are a few craters like Chebyshev and a couple like that, in fact they have large blocks around the outside. King is anogher one that has the outer flanks of King look very much like the center feature in the interior.

CASPER Now, I got North and South Ray again, and -

CAPCOM John's probably at station 5 now, Ken.

CASPER Okay, I guess I really can't say I see them.

CAPCOM They're packing up to move on down to station 6 now.

CASPER Okay. I can see 1, 2, 3 distinct layers, and it looks like several streams of material that go from the interior of South Ray over to, one of them points out goes in South Ray and over lift and down the outside. And it points over towards Baby Ray, and I'm trying to look at the material. All those things where you said we could see all those (garble) and things that we looked at back at in the (garble) Descartes, just don't show, Hank.

CAPCOM Roger.

CASPER And I'm looking down into the floor of Delambre and it looks like Delambre has two different units. One that kind of floods in from the west, it looks like it sort of fills the floor there. All that stuff we talked about and all those things we looked at in the plotter are apparently below the resolution of what I can see with these binoculars. And in general as the sun comes up, my first impression with the lower sun, was that the

CASPER material to the, of Stone and Smoky were the same and the Descartes (garble) material was also part of the same thing. As the sun angle comes up, it starts to change it's charater a little bit, and it's looking more like the plotter photo's.

CAPCOM Roger. It sure seems that the sun angle really effects what, what you're able to see, and I guess you about ready to look at Alphonsus. Is that correct?

CASPER That's correct.

CASPER Yeah, we're just coming up on Alpetragius, (garbled) now. I wish we could get a couple more of those light photo passes. That was the one time when the windows were really pointing in the direction you would like to have them. Other than that you have a permanent crick in your neck.

CASPER I've looked at Alphonsus on quite a few of our revs and if the low suns there was absolutely no - nothing I could say about dark halos around those little craters. Now this time I look at them and there is a very obvious dark halo, and it looks exactly like the dark halos you see around the two craters to the south of Theophilus. I've looked for some topographic or surface features that might be different between the northern and southern halves of Alphonsus and I've had absolutely no luck at all with that. I see now one, two, three, distinct dark halo areas and probably a fourth one. The rim of Alphonsus and the rim ---

END OF TAPE

CASPER I see now 1 2 3 distinct dark halo areas and probably a fourth one. The rim of Alphonsus and the rim of Theophilus are inseparable. Here I am right now, I haven't quite gotten to it yet. The long north south trending linament that runs through Alphonsus looks just like the photographs and does indeed run up there, and it runs through the wall and looks like it's an extension of the little crater chain that runs through Theophilus. Hadley's Rille and the floor of Theophilus looks just like it does in Alphonsus, I don't see any really significant difference. The only thing I can say about the dark halo area is, in Alphonsus, is that, now I can't get the binoculars on them. I can't get close enough to the window. And if you remember that one that we looked at the blowups of I'm looking at that now and yeah, there's a slight albedo difference or a darkening of the material around it. It doesn't look any different than any other down there. It's filled on the western flank, it has a slightly raised rim around the eastern side, it's very subtle, it looks very subdued. It looks just like all the rest of the craters that you all over the rest of the Moon, nothing significant about it, except it's setting. I really don't see any relationship between Davy and Davy's chain with any other feature that shows Theophilus or the surroundings. (garble) I can't even get over far enough to take a good look at Alpetragius. Balmer is just about out of the field of view. And one thing I am going to try to take a look at and I don't know if we have enough sun yet, and I'm going to use these bi-level red and blue filters and take a look at LaSalle Sea. And see whether or not there's any enhancement that's comparable to what we've seen in the photographs of the red and blue filters. And just looking at these things directly through the filters you don't see anything there at all, I didn't really think you would but it was an interesting thing to try.

CAPCOM Roger, copy.

CASPER And I do see a lot of, that little crater that is out to the west of LaSalle Sea, the one that looks like it has a little (garble. It's very obvious now that the sun come up higher and it does look a little different, but there's so many of these little craters and little mountain things that stick up through the floor of the Mare, but's not real obvious that that's anything out of the ordinary.

CAPCOM Can you see a little bright ray there?

CASPER Say again.

CAPCOM There should be a little bright ray, I think isn't it? Right near the perspective dark cone?

CASPER Uh, I didn't see any bright ray around it.

CASPER                    No sir. And you can see all of Fra Mauro area now and Rima Parry system stands out. You can see Parry, Bonpland And most of the highlands material that's over to east of Fra Mauro, itself all has the same appearance as though it belongs to the same pattern.

CAPCOM                    You ought to be approaching the terminator, now. Is that right?

CASPER                    Yes, sir. And I have been rather impressed with the fact that most of these little grabens or rilles, in the low sun it appears to me that the floors of these things have a lower crater density in general than the outsides of the craters, the crater density on the outside would be of the rille itself. You can see this in low sun angle quite dramatically And just to the west of Fra Mauro area we've got another rille coming up. And in places it looks like it has little, little ridge around it. When you get to real low suns in this very model surface it looks more like your looking at some of those sponges and things you see on the ocean floor than it does any part of the Moon, way it will look when the sun comes up. Okay, Hank, do you have a couple of photopads for me?

END OF TAPE

CASPER Okay, Hank, so you have a couple of photo pads for me?  
CAPCOM I sure do.  
CASPER Okay. Why don't you fire away.  
CAPCOM Okay, the first ones at 4 - 148 10 and it's pan camera pad  
CASPER Okay.  
CAPCOM T start 148 07 14, T stop 148 17 14,  
CASPER Okay. T start for pan camera 148 07 14, stop 148 17 14.  
CAPCOM Okay. At 149 05 on the next page your former corona pad.  
CASPER Okay.  
CAPCOM 149 02 56.  
CASPER 149 02 56.  
CAPCOM And the same page, down at 149 25 pan camera pad, T start 149 16 24, T stop 149 38 04.  
CASPER 149 16 24 and 149 38 04 for the pan camera.  
CAPCOM Roger, good readback.  
CAPCOM And if you've got your scratch pad handy I've got a couple comments I'd like to - questions I'd like to get up on the Guillo you mentioned a while ago.  
CASPER Okay, standby, let me get it.  
CASPER Okay. Go ahead.  
CAPCOM Okay, you described this big hole with a black blob and the question is, is the big hole a crater or does it look more like a volcanic vent?  
CASPER Well it looks to me like a crater. Like all the rest of the craters around here except it occurs in the side of a crater wall. But I've been looking for similar features and there's quite a few of these big real large craters which have similar sized craters in their walls too so I wouldn't say that anomalous.  
CAPCOM Roger and do you - does the blob look at all like lava?  
CASPER (laughs) Well, I can't get close enough right now to see --  
CAPCOM Okay, we just want you to have these questions.  
CASPER -- a few things look like flows. One of them is - Yeah, obviously that one of the things I don't think we're going to be able to answer that question. At least I can't. But it looks just like the material you see coming down the side of the mountains to the north of Flagstaf. I know that's lava, but, whether this is the same sort of thing, I don't know because there is so many places on the back side where you see what appears to be flow lines and if you follow them far enough, you find some place where they get lost. Now this one has a real dark sediment material

CASPER                   When I say real dark, I mean dark compared to the rest of the Moon and it's - it seems to be consisting of 2 different flows or 2 different units; one much lighter and closer to the regular lunar surface. Both of them are darker though and the dark ones look like the same kind of dark material. I say it looks the same as what you see subtle expressions in the little domes in King along the central peak.

CAPCOM                   Casper, could you put took the laser altimeter

CASPER                   Oh! Yes sir. It's on.

CAPCOM                   Thank you.

CAPCOM                   Okay, and could you give us an estimate on how large this feature is?

CASPER                   Oh, Oh, I was afraid you'd ask that? Let me get a scale on Guillo. The crater is in the almost due west of the wall pointing to Loboschesky and I would say the crater is about, between a quarter and a third the diameter the diameter of the crater is between a quarter and a third the total depth from the floor of the crater Guillo up to the rim.

CAPCOM                   Roger, copy. And re-re- you got another opportunity to look at this thing on the next rev, I think. Our figures here show that your time of closest approach is 147 31 04. And you should be able to see it through window 4 and then window 3 as you go by. And this is just information if you do want to take another look and take a stab at these questions and any other things you see about it.

CASPER                   Okay, I been - I commented on this thing I thought, some time yesterday, the first time I saw it. I've been looking at it periodically. Unfortunately it occurs at the same time King does and you get all wrapped around the action trying to figure out which one you need to work on.

CAPCOM                   Okay. Just threw this out in case you wanted to take a look at it.

CASPER                   Yeah, thank you very much. I got you a couple of pictures of it.

CASPER                   Let's see. I'll try to whip off a P52 for you here before I start to exercise.

CAPCOM                   Hey, that's real good, Ken. We were hoping you'd donate a couple minutes of your exercise period to that.

CASPER                   I'm so far behind on exercise now that I may never exercise again. It's really going to hurt when I get back and have to go to work.

CAPCOM                   Ken, you have been getting some exercise You haven't been omitting these exercise periods have you?

CASPER                   No. No. But that just isn't - you know - that just isn't much. I can hardly get a heart rate enough to even tell it's there. Doesn't seem like I can change 'em

CASPER with the equipment we have.

CAPCOM Okay. Well, we want you to take full advantage  
of all these.

CASPER Naw, I'm getting my exercise. (laughs)  
Yeah, well, you feel better when you get through after having  
done something like that. Even though I don't think it's  
enough exercise to amount to anything.

END OF TAPE

CASPER Amount to anything (laughs) Yeah, well, ya feel better when you get through having done something like that. Even though I - I don't think it's enough exercise to amount to anything. It just makes you feel better. I advocate doing 'em.

CAPCOM Casper, we have the angles. You're a clear start.

CASPER Okay, I'll catch it at 50.

CAPCOM And you better get your camera set up, Ken, for the sun ray photos.

CASPER Okay, thank you.

CAPCOM And when you get to that, you might as well do your exercises. I don't want to interfere with that. I'll just give you a brief call prior to LOS.

CASPER Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/24/72 CST 14:24 GET 146:42 CM-123/1

CAPCOM Casper, Houston, do you read? your looking good at LOS. And we'd like you to verify the DSCS doubles.

CAPCOM Casper if you still read the surgeon says you got your heart rate up to 90 now.

CASPER Hank, according to that theory it sounds like the hardest work I've done in this flight was lift off.

CAPCOM Roger. Hey, Inco, says he's going to take care of the taperecorder but you might ought to verify.

END OF TAPE

CASPER Hello there.

CAPCOM Hello, Ken, how did it go on the last pass?

CASPER Oh, it went all the way around, came back out front side and got exercise, got some terminator pictures, and got a good look at Gooyo again. I guess I'm going to have to going to have to make a few corrections to my size estimate on that thing at Gooyo. It looks like the crater that it's coming out of is really like half the size of the Gooyo, feature. Instead of what I'd said before, about a third. And not only that but the I saw something else this time that was also went unnoticed before. The crater is located right at the top of the rim and works its way down to about half way, then this dark material comes out, and there's 2 shades of this dark material. Then this striation that shows up is like all the rest of these lineaments we've been seeing all over the Moon. And I think I remember saying something as I passed Theophilus on one of our early REVS, right after we got here, that it looked like these patterns that we see that are all over the surface are on the sides of every hill and every vertical surface they all seem to follow the contours of any local topography. There's a -- like at Theophilus I first noticed it here on the crater rim, there's a lot of little craters up along the sides and those little craters that are up along the sides left impressions down inside the these striations that run around the rest of the Moon, or the rest of the crater interior. And that happens every where you look.

CAPCOM Could there be fractures or something like that?

CASPER Well that was what I was wondering if these are shocked reflections or something like that. Then I guess that still is a reasonable hypothesis. Except these things are all over the surface, every where you look, places where you really wouldn't expect to see shocks, but you know maybe they're there after all.

CAPCOM Did you happen to observe going by King this time anything up to the north, any expression at all of the Soviet Mountain?

CASPER Yeah, I been looking for those for quite a few REVS now and I cannot follow the rays of King out to the north and make any conclusions at all about. I can see some of the ray material that comes down from King but or comes out from King, I should say, but I'm really having no luck at all tracing that stuff to the north. Then I started looking for the Soviet Mountains and when you look north and south way out on the horizon there you get the impression that there north and south (garble) very subtle constructional build, but I'm not sure isn't just the way we're looking at it, because every time you look cross sun you're going to see that sort of pattern. Anything that's there is going to show up and if you put it enough of these craters together they are

CASPER bound to make a line, so I can't really say that I see one, it appears to me that if there is there's a very, very shallow rise which instead of calling it a mountain range I would call it more like a plateau front similiar to the Kant Plateau rise as it comes up from behind Theophilus.

CAPCOM Could you give us high gain auto position?

CASPER You have auto.

CAPCOM Okay, I guess the laser altimeter is down to about 50% now and the ground site is not going to goover that part so we're not going to get any laser information to give us any data on the topography in that area ---

END OF TAPE

CAPCOM See the laser altimeter is down about 50 percent now. And the ground track is not going to go over that far, so we're not going to get any laser information to give us any data on the topography in that area and that's why we're particularly interested in your observations of whether there is actual rise in the topography there or not.

CASPER It's real hard to say. I'd say if there is it - it's like a plateau though, acts very subtle.

CAPCOM Ken, could you give us wide beam width and then back to narrow.

CASPER A-a-a that doesn't seem to help. Let me go back and try-er.

CASPER Okay, I get ya got it back in narrow.

CAPCOM Okay.

CASPER You want me to try auto again.

CAPCOM Okay, Ken, go back to auto.

CASPER Okay, think you got it that time.

CAPCOM Anything else to report on your backside observations, Ken?

CASPER Say again, Hank.

CAPCOM Do you have any other comments about the backside observations?

CASPER Naw, I guess there's some stuff around King there again. The more I study that one feature, the more I see with it, which is sort of what you would expect. And kinda nice cause it's right on the ground tracks so often. Looks like there is a lot of material that I would call an ejecta blanket that comes out from it. It seems to climb up the side of craters around it, surrounding it. And it looks definite like there is some kind of a flow and again I would characterize it more as a mud flow than anything else. It looks like it comes out of that southeastern corner. The stuff that goes out to the northeast and to the northwest is all, looks like it comes out a lot faster.

CAPCOM Roger. Can you see any expression on that central feature out to the north?

CASPER Say again, please.

CAPCOM The central feature there - the Y in the King crater. Can you see any expression of that out to the north, through the north wall of the crater up toward the north?

CASPER Naw, no better than you can looking at the photographs. There's a lot of light material up there that has what looks like dark material sticking through it. It looks that way very obviously, looks like there's rocks and - it's still hard to determine if that's rocks or if those are shadows, but I've seen it a couple of time looking back from the - from west to east and it still looks like hard shadows

CASPER so it must be dark material or a block at least, rather than shadows.

CAPCOM Roger. We're going to have the rest of your flight plan up date for you later in this rev Ken, and I noticed it's supposed to be your eat period and I don't want to eat up to much of that, if you'll pardon the expression, so I'll hush up for a while.

CASPER After a pund like that, you'd better.

CAPCOM Roger.

CASPER That was so bad, Hank, It belongs on our thought for the day board.

CAPCOM Roger.

CASPER Hank, did the surface guys say anything about - have they seen any different kind of material? I guess - I understood all they saw yesterday was breccia. Have they seen anything else this morning?

CAPCOM Standby.

CAPCOM Ken, most of the things they've seen today are breccia again. They did find one rock they thought was crystalline, but there is some doubt about it.

CASPER. Well, based on our past experience, when you see a crystalline rock it's best to be quiet about it, I guess.

END OF TAPE

CASPER Okay, the gamma ray is coming to retract.  
Mark.

CAPCOM Roger.

CASPER Barber pole and my watch has started.

CASPER And Hank, how about if I put the pan  
camera to power at the same time I take the image motion so  
I can have a couple extra seconds to look at the landing area.

CAPCOM That's fine, Ken.

CASPER Okay, image motion is barber pole, pan  
camera is stand by stereo hour, barber pole in gray.

CAPCOM Copy.

CASPER And the gamma ray boom is coming off,  
mark.

CAPCOM Roger.

CASPER Boy, as the sun angle comes up, now, the  
features in the landing area are really fading out.

CASPER There is more evidence of terracing  
and banding in Smokey Mountain than there is in - (garbled) it  
looks like.

CAPCOM How close are they going to get to that.

CASPER At this sun angle I can see 1, 2 say again.

CAPCOM I was just curious how close they were  
going to get to those bands on their trip to North Ray.

CASPER Yeah, well, the other thing is they were  
going to go down to Ravine and looks to me like the material  
at Ravine is about the same material thats around North Ray.  
If they get there and come up the way their scheduled to it  
looks like their going to be in the same unit that they would  
have gotten down at Ravine. You really have to look at this  
stuff at all sun angles because you see different things  
from hour to hour, really amazing. How we doing on the  
pan camera?

CAPCOM Still got a little over a minute to go,  
I'll give you a call.

CASPER Alright, sir. It sure looks like that  
stuff that comes into the - looks like North Ray was blasted  
into a piece of Smokey Mountain what it really looks like.  
And the Smokey Mountain and the stuff out to the east of  
there is really probably all from the same stuff.

CAPCOM Casper, about 15 seconds to T start.

CASPER Okay, we're operate barber pole and gray.

CAPCOM Roger.

END OF TAPE

CASPER                    You, know it's very interesting down here in Alpetragius there's a lot of the linear features that line up with the Imbrium sculpture. They come right down, come through Alpetragius go through the central peak, come right to the southern wall they go on out and one of them goes on down and hits the rim of Arzachel.

CAPCOM                    That sounds pretty interesting there, Ken.

CASPER                    I'm looking at LaSsell Sea and a little highlands that's by it. And remember we had a red and blue color difference and right now the southern piece with a crater in it is sort of a tan color and northern piece is gray, when I look at the Mare I see a big swatch of the tan colored Mare down to the south that goes over towards Guericke and I see a tone of darker gray material. The area around LaSllleSea has the tan tone to it, and it goes out about as far as our little cone and little bright crater next to it, that's about the outer limits, maybe just a little beyond. Then there's a patch of this tan stuff that's down to south and about lines up with Arzachel Rille that's over to the southeast then there's a patch of the gray colored Mare down inside of that. There's just a little circular piece. And looking at the Lassell Sea, feature , I look at it in detail it appears to me that this tan stuff on the south end of it has fewer craters than the stuff to the north, although not an awful lot, but there's little pitted craters all over the northern part, there not in the southern part and there are a couple of light streaks bands that appear in the southern (garble) that you don't see in the north.

CAPCOM                    Can you still see Lassell?

CASPER                    Say again, Hank.

CAPCOM                    Can you still see Lassell?

CASPER                    Just barely, yeah.

CAPCOM                    Okay, I was just curious why we don't see that little dark feature that's been reported there near the bright one. Up to the west of Lassell Sea.

CASPER                    Oh, you do, Hank, I didn't mean to say you didn't see it. I said it doesn't look like what we saw before. What we thought we saw. It's a smooth sided thing uh, let me get the binocs on it. Smooth sided but through the binoculars it doesn't look at all like a cone. It looks like a little dome with one side of it broken out.

CASPER                    And there are several little domes out here now that I hadn't seen before.

CAPCOM                    When you say side broken out, do you mean like a fractured out piece, or does it look more like a crater?

CASPER                    Well through the visual, just through you eyeball it looks like -- we'll have to catch that again later, but it looked through the eyeball like it had a crater in it.

CASPER When I got the binoculars on it it looked like just a section of it was broken out.

CAPCOM Any evidence of where it went?

CASPER No sir. That's a loaded question.

CAPCOM Roger.

CASPER Next thing you're going to want to know is how it came to be there.

CAPCOM Are the other domes similiar in appearance to that one?

CASPER Uh, yeah, they're not as large. And I hadn't seen those before just now, they're right in the corner of the window as usual. It's going to take a little work to find them.

CAPCOM Are they all complete or do they have pieces missing also?

CASPER Hank, I just saw them at the time I mentioned them and the best I could tell they are complete.

CAPCOM Okay.

CASPER But, I'll have to take another look, I could have gotten caught with a crater that inverted on me too. I'm going to have to look carefully to make sure I didn't do that.

CAPCOM Uh, Ken, we're about 15 seconds from T-stop.

CASPER Okay, stand by. How about if I go ahead and put the gamma ray out?

CAPCOM Roger, go ahead and the lenses is stowed.

CASPER Okay, and the power's coming off the pan camera, mark. The gamma ray boom is on its' way out with a barber pole. And I guess you'd like to have the shield off while I'm about it I'll do that. And I'm ready to copy your pads.

CASPER Or whatever things you said you had there.

CAPCOM And, Ken, could you get the mass spec on for us all?

CASPER It's off.

CAPCOM Roger. Okay the first change is at 1--

CASPER Did we lose an element?

CAPCOM Negative, that was a flight plan change and we're just getting to it. We want to look at it REV OFF and then we're going to bring it back on.

CASPER Okay, that was the one that we had agreed was a don't waste time call, and I thought maybe you just watched an element burn out.

CAPCOM Negative, I guess I should have warned for I hollered that. The first change after that comes at 149:39.

CASPER Go ahead.

CAPCOM Okay, after pan camera stand by at T-stop, add gamma ray deploy pan camera OFF, parenthes MSFN cue. And I don't know whether you can squeeze it in there or not, but we

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 15:52 GET 148:10 CM-127/3

CAPCOM                   also want to add mass spec discriminator HIGH  
up,

CASPER                   Okay, I got gamma ray deploy, after pan  
camera to stand by, at 149:38 I'll get the pan camera off -

END OF TAPE

CASPER                    Okay, I've got gamma deploy after pan camera to stand by at 149:38. I'll get the pan camera off till you tell me - or when you tell me. I'll take the mass spec discriminator to high.

CAPCOM                    That's affirmative and in the little lift band update block, there cancel - delete photo pad PC photo pad, UV photo pad and the maneuver pad and change the TEI 53 to TEI 54.

CASPER                    Okay.

CAPCOM                    Alrighty at 149:45 mass spec discriminator to low valve.

CASPER                    Okay, mass spec discriminator low at 149:45.

CAPCOM                    On the next page at 150 hours change the SIM experiment status code to plus 1211 02222.

CASPER                    Hey, Hank.

CAPCOM                    Roger, what.

CASPER                    Your getting in the areas where we got AOS next time. How about let me go ahead and work on this sunrise solar corona set up. That's a time critical guy that if I don't get it just right I'll miss it.

CAPCOM                    Okay.

CASPER                    Can I get the rest of those updates, then?

CAPCOM                    That's affirmative.

CASPER                    Okay, thank you.

CASPER                    Data shields on.

CAPCOM                    Copy.

END OF TAPE

APOLLO 16 COMMAND MODULE 4/22/72 148:31GET 16:13CST CM-129/1

CAPCOM                   Casper, Houston, we're about 4 minutes or so from LOS. We may lose the high gain here shortly, everything looking good at this point, and Inco says it might help on acquisition to tweak your dials a little bit to pitch 10 yaw 0 for the next acquisition. And I would like to remind you to configure your DSE.

CASPER                   Okay, Hank, thank you.

END OF TAPE

CAPCOM Casper, Houston.  
CASPER Hello Houston, are you there?  
CAPCOM Roger. How's it going?  
CASPER Ah, just fine. That last sequence worked out just right on the money. Last frame off and up came the sun.  
CAPCOM What could you see through your polaroid filter?  
CASPER Ah, it doesn't do a thing. There's apparently just a little bit of polarizing done by the windows. And as I rotate the filter it brightens and dims the scene just slightly. I checked it against different types of material, the darker material and the lighter things and they all seem to respond exactly the same way. I can't see any - - I can see any effects of polarizing from the surface reflection at all.  
CAPCOM I believe I would have expected a difference.  
CASPER That time as I went by King I took a look at a little different approach. I started out with the central peek and I tried to follow it from the North. And it appeared to me perhaps those central peeks three prongs - - I was looking at the crater blocks that are on them and then I looked at the floor and there's a lot of crater blocks laying on the floor in between the two main tongues of the central fork. The - - it appears to me now that maybe there were three of those pieces of central peek that run out instead of two. And that perhaps they curve a little bit over to the right. Because you do see a line of the late material that continues on to the North for quite a distance. That's the same thing we have seen on the photos. First time that I've been able to see any continuous change that goes between the central peak into the walls. And I'd like to look one more time and see if there's any variation in the number of blocks that I see, as I look circumferentially around the walls. Perhaps there is where the expression of the peek goes through I may find a higher concentration of blocks. That's what I'd like to look for next. But it looks like perhaps if those central features do go through the wall that they must take a slight curve to the right. As the sun angle comes down these things that I reported as swirls look more and more like swirls than they did at the higher sun, which is just backwards from what I would have anticipated.  
CAPCOM Ken we're coming up on 2 stop for the pan camera.  
CASPER Thank you sir.  
CASPER And it's off. Or stand by I should say. And the gamma ray is going back out.  
CAPCOM Casper, (garble)  
CASPER Mass spect discriminator is going to high.  
CAPCOM Casper, yo're clear prepare to go power off on the pan camera.

CASPER Okay. Pan camera power is off.

CAPCOM Your comment that there may be a 3rd fork in that thing is kind of interesting. If you use your imagination you might see it in the photograph although I'm not too sure.

CASPER Well it's kind of a tenuous thing to be saying. I'll have to look some more, but I started by tracing the blocks down the ridge of one of the peaks and following it and it looked like it curved and I just followed it around and sure enough it looked like it hit a place along the wall where there might have been a higher concentration of blocks. And in the length of time your overhead with this window orientation that's about - - you get this little bitty bits and pieces. That's were that polaroid sure would be nice if you see something like that and you'd like to think about it and plan you next pass instead of doing all your planning in realtime you lay that picture out in front of you and take a look at it and then come back next time a little smarter.

CAPCOM Yeah, that'd be nice. Shame we don't have it.

END OF TAPE

CAPCOM Casper, could you give us Auto on the  
high gain?  
CASPER Okay. How about that?  
CAPCOM Thank you.  
CAPCOM Casper, we're ready for a discriminator  
low.  
CASPER Okay. Discriminator's going back to  
low. Mark it.  
CAPCOM And I have the rest of these Flight  
Plan changes for you. Just give me a call when you're  
ready to take them.  
CASPER Okay, I'll finish my little chores  
here and be with you.  
CASPER Okay, Henry. Ready to copy.  
CAPCOM Okay, Ken. We left off, I think, about  
150 hours.  
CASPER Yes, sir.  
CAPCOM Okay. That SIM code should plus all  
one's and then 0 all two's.  
CASPER Okay. Plus all one's and 0 all two's.  
CAPCOM And at the same time, we want to delete  
the PC Standby through the PC Operate T Start.  
CAPCOM We want to keep the comment in there  
about the image motion.  
CASPER Okay. That's deleted. Okay.  
CAPCOM Okay. At 150:10, delete the Pan Camera  
Photo PAD.  
CASPER Okay. That PAD's deleted.  
CAPCOM Okay. And starting there at about  
150:13, we want to delete everything except - Maybe I  
ought to read off what we ought to delete. Delete the  
Pan Camera Mono; delete the Pan Camera Standby. We want  
to keep the Mapping Camera stuff. Delete Pan Camera Off;  
delete the - Stand by.

END OF TAPE

CASPER                   Okay, in this higher sun, it sure appears that the -- the bright things that run down into -- come out of the Descartes bright spot and run north seem to be centered around that's Dollond. I guess that's Dollond B or A or whatever that thing is. And I try to trace the boundaries and all this material that's in the -- what we call the furough Descartes it runs up and becomes part of Smokey Mountain. That material looks just exactly like most of that stuff on the backside except it may be a little bit darker. I think that's the sun angle. That whole area has that same characteristic to me.

CAPCOM                   Roger. You remember that northwest, southeast trendon we saw in the vicinity of North Ray -- and it looked like there was some offsets in those grobbins and can you see any of that in there?

CASPER                   Just a second, I'm not sure about that. But it does appear to me as if the -- the floor that the LM has landed on is indeed a different unit that sticks in and it's more part of this Cayley material that's further out to the west and it does go back just about the way we had drawn the boundaries. Say again your question.

CAPCOM                   I just remember on the plotter, we looked at what appeared to be some grobbins that came across Smokey Mountain and down to the southeast of it and going back up to the northwest and they were all offset like they may have been some faulting in that area.

CASPER                   Okay, well I'm not sure what that all is Hank. That same texture that -- that has many patterns and linear lines and they make kind of a hash -- that same thing appears all over the surfaces when you look at it in detail. I think I can probably take a picture of most any one of these places down here and analyze it in depth and come up with a very similar picture. And especially the things on the backside look exactly like that Descartes area. It's just that that Descartes area is a very small place and you see so much on the back side that covers that same kind of thing.

CAPCOM                   John and Charlie reported, I guess that just south of -- between the -- where the LM landed and Stone Mountain what appeared to be a subdued crater that was some 300 meters in diameter and maybe 50 meters deep that didn't show on our map. Were you able to -- can you detect something like that?

CASPER                   There's so much noise down there Hank, I can hardly understand you. Would you say again. Sounds like you're trying to shout over a football game.

CAPCOM                   Roger, I'll try again, I guess Charlie reported a very large crater, maybe some 300 meters in diameter that was between the LM site and Stone Mountain. They were on

CAPCOM Okay, delete the mapping camera and source off, delete the experiment standby, delete the caution, delete the mapping camera retract, delete X-ray standby, delete gamma ray retract, delete the MSFN block there - the whole block - delete the mapping camera retract, delete the mapping camera laser altimeter cover close, delete P00, enable all jetts, delete the verb 49 maneuver thing, both lines and the high gain remark, and that should leave us with mapping camera off, T stop, wait 30 seconds, mapping camera standby, image motion off, laser altimeter off, Alpha particle X-ray cover close.

CASPER Okay, I concur.

CAPCOM Okay, and in addition, back up at 150:18 now, we want to add in there mass spec ION source on up.

CASPER Okay, you want to add the mass spec ION source on at 150:18.

CAPCOM That's affirmative, sir. And we - we still got the urine dump in there and 150:30, the experiment status should be plus 1110 01222.

CASPER Okay that's plus all 1's 01222.

CAPCOM Negative. In the first register there, the last digit is 0. Because we got the -

CASPER Okay.

CAPCOM Alpha particle closed.

CASPER 10. Rog.

CAPCOM Okay, and right after that we want to delete both of those P52's, both the option 3 and option 1.

CASPER Okay, they're deleted.

CAPCOM Okay, that does it for now, Ken.

CASPER It didn't leave much did it?

CAPCOM I tell you one thing you want to squeeze in here somewhere and I'm not sure where's the right place to do it. But -

CASPER I have yet to pick up a star pattern in the telescope and I'm gonna take one of these backside areas here and make it concerted effort to do that.

CAPCOM Alright.

CASPER I can see plenty of stars all over the place outside and I just can't see a thing through that telescope. And I know we could when we were in Earth's orbit. Cause the first thing I thought was that we didn't have it, and then I waited until we got around and looked at a bright part of the sky and we got hold of Scorpion and it was there and it was all beautiful and now I look out there and it's just - there's just nothing there. It's just black. And that's after getting well dark adapted.

CAPCOM Where did they go?

CASPER I don't know, maybe it was their eat

CASPER period, and they're all out to lunch.

CASPER Hey Henry.

CAPCOM Go ahead.

CASPER You know, we were going to separate the  
- the water dump from the other dumps on one of these passes  
somewhere and I don't know where that is but we're not getting  
very much collected and we probably ought to - I think I'll  
just hang onto it until it comes time to use it.

CAPCOM Okay.

CASPER Ha.

CASPER I'm looking at the little bright crater  
that has the array excluded zone that is just south of  
Madler and it looks like there is a little bit of a -  
like there's a little topographic high that runs right down  
one ridge of that ray exclusion zone, that's the one that  
goes to the south. And it looked like there was a little  
dark material in there and maybe in another pass I'll get  
a chance to see it better.

CAPCOM Where is it you're looking, Ken?

CASPER Say again, Hank.

CAPCOM Where are you looking now?

CASPER That's a little bright crater with a ray  
excluded zone that's just about south of Madler, And I'm  
looking at Madler now and that stuff that makes the bright  
ray material going out to the east seems to come up to the  
rim, you can see it, it's brighter in that area along going  
down the inside of the rim, then there's a bright streak that  
runs across the central area right across and up the other  
side and then it sorta stops when it gets to the other rim,  
but there's a faint evidence of another continuation of that  
streak.

CAPCOM That's in Madler?

CASPER That's in Madler, yes.

END OF TAPE

CAPCOM their way back from station 8 and this thing wasn't on that map but it was very obvious to them that they were driving.

CASPER I'll look and see. I really had not taken the time to compare feature just one by one.

CAPCOM Ken could you give us a barber pole onimage motion?

CASPER Okay, barber pole on IMC.

CAPCOM That's one I slipped by there just talking.

CASPER Here it is. I'm sorry say again.

CAPCOM I let that one slip by there when I got to talking to you about the land site.

CASPER Uh oh. I think you go a long ways before you get very far behind.

CAPCOM CASPER Houston.

CASPER Go ahead Hank.

CAPCOM Roger. So far we haven't seen anything smear, anything requesting that urine dump by itself. So that thing is still in question. Your next urine dump would be scheduled 20 hours from now. But it's also scheduled in conjunction with the water dump et cetera so I don't know where that thing stands so we're going to check into it.

CASPER Okay, it will probably take me another 20 hours to make it worth while.

CAPCOM Roger.

CASPER Golly oh. Okay Hank I got a better visual on that little thing we called a cone and I guess it looks like it is a crater in the top of it and from where I am, it looks like the southern end of it, which is away from me probably is just about reach down level with the mare floor. The rest of it is just a smooth cone, it sticks up, it does have some small craters on it. The rim looks relatively sharp and there's a couple of fractures that go through it. Its texture and albedo do not look significantly different than the mare around it. There is a little expression of perhaps a subtle depression around the eastern side of it that looks like it might be a little flow characteristic there. I'm going to shift my gaze down to these other 2 features and I guess -- I guess is that I really had those things reversed that they -- they in fact were shallow craters.

CAPCOM Hey, that does sound more like a little -- (garble) or a cone.

END OF TAPE

CAPCOM Hey, that does sound more like a little (garble) or cone to me.

CASPER Well, it just looks so much like all the rest of the things around here Hank. The texture of the surface looks like it's all the same. The flanks of it are fairly steep though. And it's got one of the sharper rims for a raised rim crater of any that I've seen.

CASPER And as we come over here we're coming up on the Fra Mauro, Bonpland and Parry combination. And I think's that Parry that has looks like two almost right angle rills running through it. I'm looking at rim of Parry, I don't remember the number, it's the western one that runs out of Fra Mauro. And it seems like it's more than my imagination that say's that the floor of that stuff is indeed smoother. That the - - has fewer large craters than you see in the surrounding areas, although it's pretty close to being equal in small craters.

CAPCOM Casper you're coming up on T-stop.

CASPER Okay. It's off for 3 seconds.

CASPER Okay. Mapping cameras going to stand by. The image motion is off, barber pole and ray. Laser altimeter is off.

CAPCOM Mass Spec (garble) on.

CASPER And the ion source is on.

CAPCOM And did I hear you say image motion off.

CASPER That's affirmative. Okay. And alpha, x-ray cover coming to closed.

CAPCOM Okay. I guess that about cleans that up.

CASPER And that's closed.

CAPCOM Okay. Casper I have a block data pad for you and some flight plan changes.

CASPER Okay. Why don't you start with the flight plan changes.

CAPCOM Okay. At 151 hours, and we want to - - let's see 151 - -

CASPER Hey, Hank have you have two loops bunched up. The noise is getting louder and louder, sounds like I got - - I'm trying to listen to you over a football game and I can hardly hear you over the den of everything else. I don't know whether you need to hold the mike closer to your mouth or whether you have another loop bunched up and I'm getting cross feed.

CAPCOM Okay. Let's try again Ken. How do you read now?

CASPER That sounds a little better.

CAPCOM Okay. I've told them to hold it down a little to. At 151 hours the SIM code should be plus 1110 01222.

CASPER Okay. That's plus 1110 01222.

CAPCOM Roger. And right at 151 over to the left of that write, configure comm per S-band and VHF biostatic. Now that's a real long bunch of switch settings there. You want me to read them all off or you're - - I can give you a procedure on page - -

CASPER Yeah, why don't you give me the that page it was on in the old flight plan. And only one.

CAPCOM Okay. Page 311, at about 202 hours 37 minutes, if you want to turn to that.

CASPER Okay. Let's do that. That'll save copying an awful lot I think.

CAPCOM Okay. You want to look at that right now, I have one small change.

CASPER Now, I almost got it. Ah, wait a minute. What page did you give me?

CAPCOM Page 311. It's 202 hours 40 minutes.

CASPER Ah so, (garble). We passed the other (garble) and went back for that. Okay. Alright, 311. You're ahead of me. Okay, I got it.

CAPCOM Okay. This is the only biostatic we're going to do. Start where it says configure comm and end where it says, S-band antenna high gain manual wide. And the only change in there is that the VHF antenna should be left instead of right. We're in a different attitude.

CASPER Okay. I start where it says, configure comm for S-band, and I stop where - - including I assume the high gain settings.

CAPCOM Negative. We got different high gain settings.

CASPER (garble) VHF antenna left instead of right. Okay, you got different high gains. Alright, thank you.

CAPCOM Okay. If you'll turn back now to 151 I'll give you that high gain. It's pitch 20 plus 20 yaw 209.

CASPER Okay. That's pitch plus 20 and yaw 209.

CAPCOM Roger. And verify the DSC as low band.

END OF TAPE

CASPER Okay. That's pitch plus 20 and yaw 209.  
CAPCOM Roger. And verify the DSE as Low Bit  
Rate, Record, Power, Command Reset.  
CASPER Okay. Will verify low bit rate and  
recording.  
CAPCOM Okay. And on that same page, where it  
says CSM -  
CASPER Do you want me to verify, or do you  
want me to configure?  
CAPCOM Configure.  
CASPER I say, did you want me to verify that  
DSE or do you want me to configure?  
CAPCOM Configure, Ken.  
CASPER Okay.  
CAPCOM Okay. Right under that by 151:02, delete  
all of that block about the lunar horizon. In other words,  
starting with the little block with CSM checklist, all  
through - right on down through Set OMNI D.  
CASPER Okay. That's all deleted.  
CAPCOM At 51:10, P00; and following that,  
Alpha Particle X-Ray Cover Open.  
CASPER Okay. At 151:10, we go to P00 and  
Alpha X-Ray Cover Open.  
CAPCOM At 151:20, VERB 49 Maneuver to Bistatic  
Attitude. And that attitude is 221 138 000.  
CASPER Okay. At 151:20, we go VERB 49 to  
Bistatic and to 221 138 000.  
CAPCOM Alright. Delete the UV Photo PAD Block.  
Delete the Acquire MSFN and all that stuff there, the Lunar  
Horizon, that comment.  
CAPCOM At 151:30, next page.  
CASPER Okay.  
CAPCOM And write small - P20 Option 2, NOUN 78  
plus 270 00 minus 040 63.  
CASPER Boy, Hank. That comm is just terrible.  
CAPCOM Okay. We're having trouble in here, Ken.  
Everybody's going on, and we'll get them quietened down.  
CAPCOM Okay. Repeat. NOUN 78 is plus 270 00  
minus 040 63. NOUN 79, minus 008 30 plus 000 50. NOUN 34,  
plus 001 51 plus 000 34, plus all zips.  
CASPER Okay. That says that at 151 30, we go  
P20, Option 2. NOUN 78 is plus 270.00 and minus 040.63.  
NOUN 79, minus 0.0830 plus 000.50. NOUN 34 is 151 34 00.  
CAPCOM That's correct, Ken, and as you can  
probably deduce from the Noun 34, right at 151:34, you should  
say start pitch, right? And the attitude for that is  
221 114/138 000.

CASPER Okay. That sounds reasonable. Let me ask you one question about this antenna. I've got a little discrepancy between the set knobs that I have and the feedback readouts that I get off the instrument panel. This is on the high gain settings.

CAPCOM Roger.

CASPER Can anyone tell me if it matters which I use, and which one I should use if it matters?

CAPCOM Okay. I'll get you that answer while I read you the next.

CASPER Okay. Read on.

CAPCOM Okay. Delete the rest of the things on that page.

CASPER Okay.

CAPCOM And from the next page, 152 to 152:30, delete all that.

CASPER Okay.

CAPCOM Next page, 152:30, delete everything down to where it says GDC Align at about 152:52.

CASPER Okay.

CAPCOM And, back up at 152:41, out to the side there you can write it. Add P00 Discontinue Bistatic Radar, VHF Range Off; VHF AMB Off. And then return your S-Band Mode Ranger to Ranging.

CASPER Okay. At 152:40, go to P00, Discontinue the Bistatic; VHF Range Off; VHF AMB Off; S-Band Mode to Ranging.

CAPCOM Roger. And at 152:53, you'll pick up the nominal Flight Plan again. And at - Go to the top of the next page up there, at 153:00. That Experiment Status Code, now, should be minus all one's and 01222.

CASPER Okay.

CAPCOM At 153:15, delete the Mass Spect Ion Source On. It's already On.

CASPER Alright.

CAPCOM And, Ken, back up at the top at 153 even, write at the top of the page "Configure DSE to High Bit Rate, Command Reset."

CASPER Okay. Configure DSE to High Bit Rate, Command Reset at 153 even.

CAPCOM And I think that's all of it.

CASPER Okay, I guess the thing that seems to me like it might be missing here is where you're going to get - Well, you've got me set for my to high bit rate over here at 153. I guess we'll get some of that, won't we? Because we've had it running with no dump.

CAPCOM Roger. We've been running it at low bit rate.

CASPER (Garble) and I didn't stop the Bistatic until after - That's right, low bit rate. But I didn't stop the Bistatic until after LOS; so you're going to get about half of this at low bit rate and about half of it at high. Okay?

CAPCOM Roger.

CASPER (Garble) I guess I got it straight.

CAPCOM Okay, Ken, I've got some more words on that question you had about where I should verify the DS -

END OF TAPE

ORION Houston, ORION.  
CAPCOM Go ahead.  
ORION Okay, my credential 02 recharge is complete  
and I got 95 percent.  
CAPCOM Roger. 95, Charile.  
ORION Ed, how you doing today?  
CAPCOM Pretty good, Charlie and it went real great.  
We're real pleased down here.  
ORION Well, we're happy as a clam. We just had  
a great time. When you're having fun, you're willing to work.  
You know Ed, when we got up on top of that mountain, and I had  
been driving up a long way and I turned around and looked down  
I thought, man, you've just bit off more than you can chew  
here.  
CAPCOM John, (garble), I got a lot of hash and  
I couldn't hear you very well.  
ORION Just as well. I have this beard and I  
stick it in the mike.  
CAPCOM Well, maybe you're starting late. But  
you'll catch up in 3 or 4 months with a beard.  
ORION Don't rub it in. Hey, Ed. How about a  
little news number. Anything going on down there that's  
interesting?  
CAPCOM Is that news you're asking for, Charlie?  
ORION Yes sir.  
CAPCOM Okay, stand by, we'll see if we can get you  
something.  
ORION Okay, Houston. (garble) still got 92 percent  
same as yssterday, today, 94 I guess it is here. 92 in sections.  
Houston, do you read? Over.

END OF TAPE

CAPCOM Hello CASPER, Houston standing by.  
CASPER Hello there, how're you doing?  
CAPCOM Oh I'm pressing along. Ken we'd like --  
we have (garble) some funnies on our -- on that bistatic and I'd  
like to verify the position of the VHF antenna.  
CASPER It was in the left position.  
CAPCOM Okay, that takes care of that question.  
And Ken awhile ago you were reporting that loud background noise,  
we'd like to ask you how the comm is now?  
CASPER Sounds great.  
CAPCOM Okay.  
CASPER What did you do.  
CAPCOM We asked you what the comm was and that  
fixed it. And Ken anytime you're ready, I've got some flight  
plan updates they -- we lied to you while ago when I said we  
were through for the day and I've got a TEI 48 pad.  
CASPER Okay, why don't you give me the flight plan  
first.  
CAPCOM Alright. Let's go to 154 30.  
CASPER Alrighty.  
CAPCOM Okay and the reason why we're doing this  
is the cabin is coming up a little bit and we're going to open  
the waste stowage vent valve for approximately an hour. So at  
154 30, we're adding waste stowage vent valve open.  
CASPER Okay, I guess I'm just not breathing hard  
enough huh?  
CAPCOM Oh man just great metabolism there and over  
at 155 30 we can add waste stowage vent valve close.  
CASPER Okay, the waste stowage vent closed  
at 155 30.  
CAPCOM Okay. That'll be one step off your presleep  
checklist there see and after the presleep checklist, we'd like  
to add ACCEPT VHF and what we're going to do here is get you  
configured for the VHF bistatic test during your sleep period,  
so disregard the VHF part of your presleep. And at 155 --  
CASPER Okay, you want to give me a configuration  
now.  
CAPCOM Yeah, we can do that -- the time on that  
is 155 36 and you've got about 6 or 7 lines you might want to  
fill out to the left there.  
CASPER Okay, all set.  
CAPCOM Okay. And there at 36, we'll delete the 2  
steps dealing with the VHF that you see the VHF AMTR receive  
panel 9 and delete VHF AMA duplex and then add configure for  
VHF bistatic test VHF AMT/R 3 to receive (verify), VHF AMA off  
verify. VHF AMB duplex to verify, VH -- and VHF range to range.  
And VHF antenna right. And also write all at the same time Ken,  
right here around 155 35, we'd like to -- didn't leave you much

CAPCOM room to write, we'd like to configure for 2 and a half degrees deadband pad so at 155 35 we'd like CMC free, P20 NOUN 79 plus 00 250 and then we'll go back to auto. Well are you still with me Ken or did I leave you back on the waste stowage vent valve?

CASPER Let's see, I guess the last thing I heard was are you there.

CAPCOM Yes, Houston standing by huh?

CASPER (garble) closed at 155 30 and at about 155 30 we go to free, take P20 and narrow the deadband at 2 and a half degrees and go back to auto, we take the VHF verify VHF panels are all 3 to receive, we take the VHF AMA off, the VHF AMB to duplex, the ranging to range and the antenna to right.

CAPCOM Okay. And you -- you're not going to do anything in the presleep checklist with the VHF cuz we've just given you all these others and you deleted those 2 steps that were in there.

CASPER Yes sir.

CAPCOM Okay, now let's go over to 164 10, which you will see in the morning.

CASPER Okay, 164 10.

CAPCOM Okay, we'd like to add terminate VHF bistatic checks. VHF AMB off, and VHF ranging off.

CASPER Okay, terminate the bistatic at 164 10 VHF AMB off and range off.

CAPCOM Okay, and that's all the flight plan updates for tonight at just this moment.

CASPER You got to be kidding.

CAPCOM Ha ha, I've been known to lie though.

CASPER You sure have.

END OF TAPE

CASPER (Laughing) Use your (garble). Hey, you mentioned something yesterday about the general scheme of things to come.

CAPCOM That's right.

CASPER Is that still sorta on tap.

CAPCOM Yeah, that's seem pretty much. I thought somewhere along this pass and we'd give you a little more detail specifically on what would be done tomorrow and maybe give you times of PCL and liftoff and so forth.

CASPER Okay. I got to thinking about it some last night. And the one thing I thought about is I understand the desire to keep the day down to some reasonable number. If we still have to put our suits on to jettison the LM the next day, that's going to chew up quite a few hours. And - - if that doesn't make any difference why that's okay. There's nothing else for us to do during those hours. But it seems like that's a - - take those suits off and put them back on and take them off again with three guys in here becomes a real big operation. I guess that sorta might be an option. Maybe John or - - would have an opinion on when he gets back tomorrow.

CAPCOM Okay. We copy that Ken. Just stand by.

CASPER Okay. I'm not proposing you change it, I'm just suggesting you consider the big flap that goes on when three guys have to suit up in here.

CAPCOM Yeah, I guess - - we're certainly aware of that Ken and - - the name of the game on this one is going to be to dock with the LM and transfer across with just a minimum transfer. Bring the rock boxes and your suits and the bods and that's about it. And then the next day complete the LM transfer and so forth. The name of the game is to get to bed and that's why the decision is made that way.

CASPER Okay. Alright, that's just fine then.

CAPCOM Yeah, they pretty well fit a limit here that we're aiming at Ken and that's an 18 hour day considering the EVA's and your long day so that's about the only way it'd work.

CASPER Okay.

CAPCOM And along that way tomorrow we're going to have updates for you. Later but we are going to schedule urine dump along with the mass spect, so we'll get that.

CASPER Okay.

CASPER You got power and stand by on the pan camera.

CAPCOM Okay.

CASPER And ray shield is off.

CAPCOME Okay.

CASPER And you said you wanted to give me a pad or some sort. Let me find (garble) write that.

CAPCOM And it'll be a PEI 48 pad.

CASPER Okay. That's what Hank was starting to give me when we bombed out last time.

CAPCOM That's affirmative.

CASPER Okay. All set, go ahead.

CAPCOM (garble) TEI at 48. SPS G&N 38 620 plus 059 plus 125 168 51 56 94 plus 30 522 plus 07 042 minus 01374 182 117 014, for the rest of the pad NA. Comment the GDC align same as search. Ullage 2 jets 17 seconds. Longitude at TIG minus 17200. Additional comments.

CASPER Okay. Go ahead.

CAPCOM Pad based on landing site REFSMMAT. Assume no plane change.

CASPER Alrighty. That's a TEI at 48 SPS G&N 38620 plus 059 plus 125 168 51 56 94 plus 30522 plus 07042 minus 01374 182 117 014, GDC alignment goes with certain pad 2jets 17 seconds. (garble) ignition minus 172.00. Pad is based on the descent REFSMMAT. and no plane changes.

CAPCOM Okay. That's sounds like a good read back. We got that baatuy.

CAPCOM And Ken we'd like pan camera power off now.

CASPER Okay. Pan camera powers coming off. And it's off now.

CAPCOM Okay.

CASPER I got a chance to go back and look at the telescope on one of the last 2 revs and found out the problem was that even after I had gone back and taped the eye pieces back on, it still had the tape on it but the darn thing slipped out of focus on the telescope and I guess it was far enough out of focus it that the stars weren't bright enough to show up because I was sitting there looking at it and I could focus it and then the stars would appear and disappear if I defocused it. And so I refocused the eye piece and telescope workd like you'd expect a telescope to work.

CAPCOM That little bit of trouble sounds like first for 16.

CASPER Well I would have never thought about that thing coming off if I hadn't found the eye piece floating by me one day.

CAPCOM Ah, now why did you blow your image?

CASPER (laughing) What are the surface guys doing now abouts. They cleaning up after the EVA.

CAPCOM Rog. They're going through their clean up and they've had their debriefing and I guess it's looking for them to be a sleep in a couple of hours or something like that.

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 2118 GET 153:36 CM-138/3

CASPER Joe, how long was EVA today, 7-1/2.  
CAPCOM It was close to that Ken, 7 23.  
CAPCOM Ah, that's pretty good. Guess little rover  
did a good job.  
CAPCOM Yeah, it's - - I didn't - -

END OF TAPE

CASPER That's pretty good. Guess the little Rover did a good job.

CAPCOM Yeah, its -- I didn't --

CASPER Hank was telling me they found their way up to Cinco.

CAPCOM Yeah, I didn't get a chance to -- to watch to much of that but I did see one when they were up on the southern point they put the camera out on South Ray and it was just magnificent.

CASPER Save those tapes, I'd like to see that. What kind of funny did you notice on the bistatic? Were they just not getting any VHF signal?

CAPCOM Well yeah, we didn't have it initially and then some of the words I heard was that we're getting a signal but it was not reflecting properly and then we picked it up somewhere passing over the landing site and got some data so I guess I'll have to get a better recap of that pass but I guess -- I guess the signal was there but just -- just not hitting the right reflective point.

CASPER Well, I'm just impressed that you can bounce the signal off the Moon that's as weak as this one. They can catch it back at Earth anyhow.

CAPCOM Yeah, and it's really not much of a sweat Ken because we're going to run it through the night here anyway.

CASPER Okay. Hey when I turn the waste vent on for an hour here, would it -- would it make any difference to the mass spec people or anyone like that if I plugged in the black bag for a few minutes?

CAPCOM Standby. Okay Ken we have a go from all hands to vent the bag.

CASPER Okay. We do appreciate that.

CAPCOM Rog.

CASPER What's your prognosis on the pan camera, is it getting us any good data or is it going to be kind of sloppy?

CAPCOM Okay, Ken we're as I mentioned yesterday, it looks like we're overexposing about 1 F stop and there's alot of -- you know -- we'll take that out in the processing and everybody feels like the data is real good.

CASPER Oh, outstanding.

CAPCOM And Ken as you whip by the side over there if we could get you to put the --

END OF TAPE

CAPCOM And, Ken, as you whip by the site over there, if we could get you to put the gamma ray shield on center.

CASPER Okay. Do you want it now?

CAPCOM That's affirm.

CASPER Or did you want me to wait? Okay, here it comes.

CAPCOM Sorry about that.

CASPER It's on now.

CAPCOM Okay.

CASPER I was looking at the little dark halo craters around Matler, and the one that's directly to the - yeah - east of Matler has white streaks in it. I guess that's fair. If light craters can have dark streaks, I guess dark craters ought to be able to have light streaks in them. I don't know what that means to anybody.

CAPCOM Copy. That seems fair.

CASPER There's a little beauty that's just to the south of the landing site. It's up on a big, tall dome, and it's got all of this big, bright, white-rayed crater in the top of it. I'm looking at North Ray, now, and it seems to me that that stuff that runs up on the North Ray comes right around the corner, and comes from out in an area back behind what we used to call the -

CASPER Just as I was coming up on the landing site that time, I saw this little, very soft dome sitting up, and it's got this nice, white-rayed crater right in the top of it. It's just like - The crater itself looks like South Ray; and the - except that it's built up on top of this nice little dome. And I don't know if that's coincidental, or what, but it sure is an interesting thing. The crater is about a third the size of the dome itself.

CAPCOM Roger. Copy. And, Ken, have you been mumbling any geological terms to yourself the last couple of passes?

CASPER No, sir. During that Bistatic, I just kept quite inside, too.

CAPCOM Okay. How were things around on the other side?

CASPER That was a good chance for me to - Yeah, that was a good chance for me to get caught up on all of the housekeeping and loose ends and kind of pick up some stuff here and there. That was a well-needed break.

CAPCOM I certainly agree.

END OF TAPE

CASPER Hey, you know looking down at this material to the North of Alpetragius - - Albategnius excuse me. That material if you didn't have all these craters around it, that train scene could have been placed on the back side almost any where. Got exactly the same characteristics - - the same - - everything about it's the same as a mixture we call Cayley and other stuff.

CAPCOM Okay.

CASPER And the Cayley floor fill that I see in Talamais. And all these things looks exactly alike what you see in Mendeleev. I've been looking for something I could say was different. I don't see a thing.

CAPCOM Okay, that sounds like a good observation.

CASPER (garble)

CASPER I look at Alphonsus I'm looking at the Eastern of the dark gray craters, the one that almost due East of the central peak. The largest rate deposit there. And to an unaided eye it stands out quite dramatically. When I put the binoculars on it, the difference is extremely subtle. You really have to look for it. And then it just turns up to be a slightly different color but I can't say anything at all about any difference of textures or any other thing that's different except there's a slightly different color to it. But it more obvious to the unaided eye than it is to the - - high (garble) magnification.

CAPCOM Okay. Ken I guess what you're trying to say is when you get to close to the forest you can't see the trees.

CASPER That must be.

CASPER Looks like most of these medium sized craters our here in Corbedo are - - they have raised rims. They're very smooth raised rims and they kinda - - they have a convex instead of a concave side to them. That's very much like the little suspected cone we saw next to Lassell Sea. And he's by himself out there and as you get into Corbedo you see quite a few that look just like that.

CAPCOM Fine show. We got that Ken.

CASPER Okay. Maybe we could have drawn a terminator that was a little more over towards the area where we show our target but there may be quite a drop off in elevation here. It would on take a - - quite a bit to the sun angle wouldn't have to be an awful lot geologic skill, I guess. But the actual terminator was running down just to the West of Lealdas so I ran out a strip down that.

CAPCOM Okay. We got that. You want to give us a frame number while you got it handy.

CASPER Okay. Good show. How about 84.

CAPCOM Okay. 84.

END OF TAPE

CAPCOM And CASPER, Houston.  
CASPER Go ahead.  
CAPCOM Okay, Ken as far as tomorrow, you got a full schedule of assembly and visuals and land mark tracking and so forth and I'm sure you don't want the details now. Would you be interested in the times of PC 1 liftoff and that.  
CASPER Yeah, let me get my -- let me get my little scratch pad out here and let you give me a kind of a summary of major events anyhow. Okay, go ahead.  
CAPCOM Okay, well I don't want to -- first part of the day, I really don't want to try to get into any details Ken -- it's your standard P20 with alot of mapping camera, pan cameras and all the sensors we got -- we got going -- you're going to burn plane change 1 at 169 plus 40, that's approximate time. And LM liftoff is approximately 175 plus 50. And I guess toss one in the middle to your landmark tracking will come at about oh 173 20, something in that order and after docking we're showing you.  
CASPER Hey, that's the landmark on the LM?  
CAPCOM That's the landing site landmark.  
CASPER Okay.  
CAPCOM And we'd like we have auto on the high gain.  
CASPER Right you've got it.  
CAPCOM Okay, and then as I said before, after -- after docking, at this time we're showing you an hour an 30 minutes of transfer and then you'll come inside, have an eat period and hopefully start the rest period. And your rest period will start at about 100 -- start at about 181 30 in that area will be the rest period.  
CASPER Okay, and the day starts about 164 was it?  
CAPCOM That's affirmative, around 164.  
CASPER Okay, that's not so bad.  
CAPCOM No, the way you've been swinging along up there doing all that good work, you'll just romp through that.  
CASPER Man I tell you, it was kind of -- it was kind of nice to just sit back and have that bistatic pass to catch up on all the things you been putting off.  
CAPCOM Yes, I know what you mean.  
CASPER Okay, and since you reminded me of film, let me give you the -- what I got on this DAC magazine too, while I'm taking it down. That'll save asking about it later. I have a feeling we may be quite a ways behind on our film status. Magazine II has -- that'd be 20 -- that looks to me like 42 percent.  
CAPCOM Okay, I copy. II item item and 42.0 percent.  
CASPER Yeah.  
CAPCOM And I missed your last.

CASPER                    That's quite a bit off from the prediction  
I wonder if I -- I turned it on at the right time and I turned  
it off at the right time.

CAPCOM                    Oh I don't know Ken, that's -- that's with-  
in 18 percent.

CASPER                    (laughter)

END OF TAPE

CAPCOM And Ken, the word here is their not concerned about that percentage just as long as you photograph the old mass spec.

CASPER Well, we photographed something that was pointed in that direction.

CAPCOM Yeah. The bracket didn't break off, did it?

CASPER We took lots of photographs of it, whatever it was. (Laughter) No I got worried, I knocked it once, and -

CAPCOM If you dropped it I was worried the heat shield.

CASPER It is unbelievable. (Laughter) Well, I started to say I was worried about the spacecraft. We'll probably get the pictures back and find it has a natural frequency that's the same as the camera.

CAPCOM That's why they made it so big.

CASPER That thing wouldn't even vibrate on a Saturn V. I think the part I liked most about this experiment was Cris Perner's little window shade. It worked just fine and couldn't be simpler.

CAPCOM And Ken, on your next time around, we're gonna want to be talking a little bit about your rendezvous procedure for tomorrow and I guess we'll - as we mentioned before we're recommending using SCS and we've got the procedures marked up and we can give you as much detail as you want on them as far as the switches so you might be thinking about that. And any questions about it.

CASPER Okay. I think what you told me yesterday sounds like a good plan. I don't think that's very difficult to remember and it goes - it's straight forward enough. It goes right along with operating without an IMU except you have a luxury of having all that nice maneuver for you.

CAPCOM Yeah, Ken, it's - you know we talked about a couple of little pitfalls there of you know - going to CMC control with the SCS - I mean with the optic switch in manual and that type thing and we would like to go through your procedures and stick in a couple of steps that would result - you know in that wrong procedure. Now as far as the details on where you put your SCS switches and so forth, I've got a sterling plan worked out, I don't know how much detail you want on that sort of thing or just turn you loose and say do it in SCS.

CASPER Oh, I'll take all the thoughts that you got, Stu.

CAPCOM Okay, we'll probably give you those on your - or we will give you those on your next time around

CAPCOM so you can cogitate on them.

CASPER Okay. I'd hardly be the governments  
hero if I over-torqued my dyccasons on the rendezvous.

CAPCOM Yeah, that's the one thing you've always  
got to watch out for, that and check 6. And Ken, a reminder  
on your waste stowage vent valve.

CASPER Gee, thank you. Is it that time? It  
sure is.

CAPCOM Ken, have you got any right planets in  
your view in that double umbra. That's something. A really  
beautiful sight, isn't it?

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/22/72 CST 22:18 GET 154:36 CM-144/1

CAPCOM                   And, Casper, we're about 2 minutes to  
LOS, and we'll see you on the other side.

END OF TAPE

CAPCOM Casper, Houston. Are you reading?  
CAPCOM Casper, Houston. Are you reading?  
CAPCOM Good morning, Casper. This is Houston.  
CASPER Good morning, Bob. How do you read me?  
CAPCOM Reading you loud and clear. How me?  
CASPER Loud and clear.  
CAPCOM Okay.  
CAPCOM Alright, Casper. Let's put the High  
Gain to Auto, please.  
CAPCOM Go ahead.  
CAPCOM And Casper, as soon as you can, we'd like  
to go ACCEPT and get a state vector up to you.  
CASPER You've got ACCEPT.  
CAPCOM Roger. Thank you.  
CAPCOM Casper, have you zeroed the NOUN 26?  
CASPER Yes, sir.  
CAPCOM Okay, thank you.  
CAPCOM And, Casper, I've got about 4 pages of  
Flight Plan changes for you. A few of them take effect in  
the next 5 minutes or so.  
CASPER (Laugh) Okay. I'll be ready to copy  
in 5 seconds.  
CAPCOM (Laugh) Okay, sorry to rush you; but  
I just got handed a fistful of paper, here.  
CASPER (Laugh) I hope it's green!  
CASPER Go ahead and read. I'm ready to copy.  
CAPCOM Alright, Ken, give us High Gain Auto.  
CASPER You've got it.  
CAPCOM Okay. I guess the first thing I'd  
better get to you is at 164:13; we want to a manually roll  
clockwise 40 degrees.  
CASPER Okay. 40 degrees clockwise at 13.  
CAPCOM Rog. That's about 3 minutes away.  
Actually, there was a TEI 55 PAD 5 minutes ago. But  
I'll get that to you later.  
CASPER (Garble) six somewhere here, I'll  
bet you.  
CAPCOM At 164:16 we want to delete everything  
from CMC Mode - Free, down to GDC Align at 164:21. And  
it's your computer.  
CASPER Okay.

END OF TAPE

CAPCOM ... and it's your computer.  
CASPER Okay. I've got that.  
CAPCOM Okay. Have you copied the deletion and  
also that it's your computer?  
CASPER Yes, sir. Are you not copying me (garble).  
CAPCOM I guess I'm copying you intermittently,  
Ken.  
CASPER Okay. It sounds to me like I'm keying  
I'll try to talk a little louder.  
CAPCOM Okay. I reading you loud and clear, now.  
CASPER I have the manual roll 40 degrees  
clockwise at 13; and I have the computer in Block.  
CAPCOM Okay. And did you copy the deletion of  
CMC Mode - 3 down to GDC Align at 164:16?  
CASPER No, sir. I did not. Okay, I'll  
delete that.  
CAPCOM Okay. It may be that I'm transmitting  
intermittently.  
CAPCOM Ken, I want to leave you alone there  
while you make this roll; but we've had a ground station  
(garble) parity on some of my transmission.  
CASPER Okay. No sweat. I've got the gamma  
ray gain step back On.  
CASPER Why don't you go ahead, now? I can  
listen and do this at the same time.  
CAPCOM Okay. At 164:18, we want to add P20  
(Option 5) plus X Forward, SIM Bay Attitude 165 32, NOUN  
79 plus 00050 and set High Gain Antenna pitch 10, yaw 0,  
for AOS Acquisition.  
CASPER Okay. At 18, I want to go to P20 (Op-  
tion 5) to the plus X, NOUN 79 to 1/2 degree, pitch 10 and  
yaw 0 for AOS on the High Gain, and I want to be there  
by 165:32.  
CAPCOM That's affirmative. Okay, at 164:25,  
we want to add a Mapping Camera Photo PAD. The T Start - -  
time - -  
CASPER Okay.  
CAPCOM The T start time will be 164 35 00.  
T Stop will be 168 05 41.  
CASPER Okay. Mapping Camera T Start 164 35 00;  
T Stop 168 05 41.  
CAPCOM That's affirmative. And at 164 35 in  
the Flight Plan -  
CASPER Hold it just a second. Let me mark  
that up a little bit.  
CAPCOM Roger.  
CASPER Okay. Go ahead. Mapping Camera is  
recorded, and you said something about 164 35.  
CAPCOM Roger. At 164 35, we want to add Laser  
Altimeter On; Image Motion On; Mapping Camera On at T Start;  
and Image Motion Increase Barberpole/ON.

CASPER Okay. I'll put the IMC on just before the camera starts; I'll get the Laser Altimeter On, and after we get it going, the IMC will go to Barberpole and On.

CAPCOM That's affirmative; and at the same place in the Flight Plan, you can delete the Manual Roll Clockwise 40 degrees, all the way down through High Gain Antenna pitch 10, yaw 0.

CASPER Okay. I got you there.

CAPCOM Okay. And at 164:45, we want to do a P52 (Option 3) and GDC Align.

CASPER Okay.

CAPCOM And we'll use the same procedure we've been using for that.

CASPER Rog.

CAPCOM Okay. At 164:50, we want to delete Configure camera.

CASPER Okay, (garble), stand by (garble)

CAPCOM Roger.

CASPER Let me get this maneuver going.

CAPCOM Roger. (Garble) on standby.

CASPER Well, that should be close enough for Government work, shouldn't it?

CAPCOM Okay. I'll go on with the Flight Plan here, Ken, because we're coming up on LOS. I want to at least get you through AOS. At 164:50, they want to delete Configure Camera for Terminator Photos and delete everything down through the Record Frame Number at 165:07.

CASPER Okay, I've got that.

CAPCOM Okay, and at 165:02, change that Mapping Camera PAD to a Pan Camera Photo Pad, and the numbers to go in there are T Start 165 07 13; T Stop 165 39 13.

END OF TAPE

CAPCOM T start 165 07 13 T stop 165 39 13.

CASPER Okay, I deleted all the stuff from 165 down to the 4th frame. The mapping camera becomes a pan camera, T start 165 07 13 and stop 165 39 13.

CAPCOM That's affirmative. And at 165:00 in the flight plan, we want to add gamma ray retract to 4 feet and the time is 2 minutes 43 seconds.

CASPER Okay, and at 165 you want to retract the gamma ray 2 minutes and 43 seconds worth.

CAPCOM That's affirmative. At 165:03 add pan camera standby, stereo power in operate (T start).

CASPER Okay, I catch pan camera to standby, stereo in power, and we'll start her at 07 13.

CAPCOM That's affirmative. At 165:10 10 add CSM extermant EVA checklist, solar corona sunrise page X2-11. Magazine SS, magazine HH and a note to perform only the camera configuration. We'll give you the times on your next front side pass.

CASPER Okay. What do you mean you'll give me the times. Give me a start time.

CAPCOM Affirmative and at 165:15 image motion increase, barberpole plus 4 steps on. Move that to 165:07. Okay, Ken if you read at 165:18 you can delete prepare for off side visuals and we'll try to pick up AOS for the rest of this change.

END OF TAPE

CAPCOM CASPER can you read Widebeam?  
CASPER Good morning Henry.  
CAPCOM Good morning. (garble) again. Say (garble) pretty quick this morning.  
CASPER (garble) couldn't take any more of that huh? Yeah, that's a good way to start. Starts off with a nice little anocuous remark like we have some flight plan changes for you. By the way they start in 2 minutes.  
CAPCOM Roger well how quick can you move, I've got another fist full.  
CASPER (laughter) I figured you might. Go ahead.  
CAPCOM Actually I -- I was sorry to hit you with all these Ken, I know it's a mess but the PI's are trying to recover as much SIM Bay science as they can, considering the changes in our overall flight plan.  
CASPER I understand that. Go ahead.  
CAPCOM Okay, you've already beat the image motion is that correct?  
CASPER No sir, I got that down here at 165 27.  
CAPCOM Okay, I didn't know whether you had gotten that change or not. Okay, we'll go by that. We want to delete the orbital science for this rev, so you can delete that little line there at about 165 18 where it says prepare and at 165 30 at the top of the next page, delete pan camera mode standby and power on. And down at 165 35 delete the pan camera power off MSFN Q. Okay, let me update your times here that 165 31 where it says mass spec, retract the 20 feet. The new retraction time is 33 seconds. And at 165 35 retract the 15 feet, the new retraction time is 30 seconds.  
CASPER Okay and that 30 seconds is -- is starting from where I stop at 165 30. Okay.  
CAPCOM That's affirmative. And delete the columbo highlands and ops -- visual observations there and in its place add pan camera standby T stop. Camera ray deploy, pan camera off, MSFN Q and Ken we're going to move these next 2 mass spec retractions up a little bit and start your eat period earlier so we can cut it off earlier but we'll do those real time. There's no need stripping up the flight plan, I'll just give you a call when I do it, and at 16 --  
CASPER Hey, that's a good plan.  
CAPCOM 165 50 there, delete that image motion increase, barber pole off and at 165 50 we'll start your eat period. And at 166 down at the bottom of the page, delete mass spec deploy.  
CASPER Okay.  
CAPCOM And in the interest of keeping your SIM status correct at the top of 165 30, the status should be plus 1211 and all 2's.

CASPER Okay.  
CAPCOM And on the next page at 166 hours, the  
SIM status in the first row is plus 1121 and the same holds  
for 166 30. And CASPER could you give us barber pole plus 4.  
CASPER Okay. You have it.  
CAPCOM Okay, going back to the flight plan. At  
166 45,  
CASPER Okay.  
CAPCOM You can make that end eat period and  
immediately following, prepare for a solar corona sunrise  
photos. And the T start for those photos is 166 5245.  
CASPER Okay, T start for the solar corona is  
1665

END OF TAPE

CAPCOM 5245  
CASPER Okay. T-start for the solar (garble) is  
166 52 45.  
CAPCOM That's correct Ken. And on the next page  
167:01 add laser altimeter off, then P20 OPT 5 for 40 degree  
South of Blaton. NOUN 78 plus 270.00 plus 087.75 plus 180.00  
and the NOUN 79 is .50. At high gain pitch 10 yaw 350 for  
AOS act.  
CASPER Okay. And 167 it's laste off, P20 Opt 5 40 degree  
South of Blaton. NOUN 78 plus 270 plus 87.75 and plus 180. NOUN  
79 is a half degree and it's pitch 10, yaw 350 for the high  
gain.  
CAPCOM Roger. And at 167:05 starting with man cam -  
mapping camera off, delete everything through enable all jets  
down at about 167:14.  
CASPER Okay. Is including mapping camera off down  
through including enable all jets, that whole block is deleted.  
CAPCOM That is affirmative. And then the next line  
turns the yaw for the high gain to the 350.  
CASPER Okay.  
CAPCOM At 167:22 delete the VERB 48.  
CASPER Let me see, am I suppose to be retracting  
that - - hey, Hank am I suppose to be retracting that boom  
now.  
CAPCOM Roger. You're about 30 seconds from it.  
Why don't you go ahead and do that Ken.  
CASPER Okay. Well let's do that when you get it.  
Get something done on it because going to have to watch it.  
CAPCOM That's a 33 second retract time.  
CASPER Okay. It's in work, I'm watching it.  
CASPER Okay. It's off.  
CAPCOM Okay. Could you give us auto on the high  
gain.  
CASPER You have it.  
CAPCOM Okay. And Ken getting back to the flight  
plan there's only one more change. It's at 167:30, - -  
CASPER All right. Go ahead.  
CAPCOM We're deleting the update block.  
CASPER Okay.  
CAPCOM And that ought to get us through another  
rev. Do you have your NOUN 93 from your P52.  
CASPER Yes sir. Let me look back here and find  
them. Okay, they were minus .103 minus 001 plus .097 and I  
torque goes at 164:47:20.  
CAPCOM Roger. Copy.  
CAPCOM And Ken I have a TEI 55 block data.  
CASPER Okay. Now, let me get my other  
book. Keep an eye on the clock here, I got another retraction  
then a pan camera to worry about there.  
CAPCOM Roger.

CASPER Okay. I'm ready to copy.

CAPCOM Okay. TEI 55 SPS G&N 38144 plus 067 plus 105 182 37 2653 plus 28642 plus 03966 minus 00969 181 095 010, the rest is NA. Sirius and Rigel 131 029 016 2 jets 17 seconds. Longitude of the Moon at tig minus 159.03. Assumes LOPC1 and liftoff REFFSMAT and it's time for the boomer track. Took 15 feet.

CASPER Okay. I'll get the boom and then I'll read it back to you.

CAPCOM Okay. Adn this is the 30 seconds.

CASPER Okay. Thank you. Now it's coming in. And it's off. Reading back TEI 55 SPS G&N 38144 plus 067 plus 105 182 37 2653 plus 28642 plus 03966 minus 00969 181 095 010. Sirius and Rigel 131 029 016 two jets 17 seconds. Lamba minus 159.03. This pad's based on plane change #1 and the SS REFSMMAT.

CAPCOM Good read back Ken.

CAPCOM And real quickly here on the SIM status mapping camera's perking along real good, 98 frame margin. Laser altimeter is now is getting about 65 percent good altitude. We've had 1431 firing. Pan camera is over exposing by 1/2 F stops cause of a bias in the exposure command voltage were 47 frames ahead on that. The rest of the SIM bay apparratus is working real-nominal.

CASPER Okay. Is the X-ray experiment detecting anything that looks unusual about the Descartes area or anything like that?

END OF TAPE

CASPER Okay, has the X-ray experiment detected anything that looks unusual about the Decarte area or anything like that?

CAPCOM Okay, I'll see if I can get a reading on that. Casper, you're coming up on about 15 seconds to T stop pan camera.

CASPER Okay, thank you.

CASPER Houston, standby. The gamma ray is on its way out.

CAPCOM Roger. Verify that that's the gamma ray Ken, we show the mass spec going out.

CASPER Oh, thank you. There goes the gamma ray out. Do you want me to go out and time the mass spec back in so that you know where it is?

CAPCOM Okay, Ken what we'd like for you to do is take the mass spec all the way out and then retract it for 93 seconds.

CASPER Okay, that sounds reasonable. Going all the way out and then back in for 93.

CAPCOM That's affirmative and that would get us back to the 10 foot point that I was just getting ready to call you for.

CASPER Okay, I'm going to bring the mass spec boom in now.

CAPCOM Okay, Ken, 93 seconds.

CASPER Okay. Okay, the mass spec is off.

CAPCOM Okay, and we're ready for power off on the pan camera.

CASPER Okay, pan camera power is off.

CAPCOM Have you had time to work up a crew status report yet, Ken?

CASPER Inbetween the other things? It's a short one, it shouldn't take but a second.

CAPCOM No rush, take your time.

CAPCOM I was just trying to get all this dirty work out of the way so that you'd have an uninterrupted eat period.

CASPER Uninterrupted will take my solar corona. Okay. How about PRD 15054, 7 hours and none. And yesterday, lets see, well, shut, they don't even have Meal A in this book. I don't know why it's put this way but - uh - you can delete the - well, the only thing I had out of Meal B that's on the list there is the graham crackers and the cocoa. I also had bacon squares, coffee, and some of that pineapple fruitcake and an apricot bar, and orange juice and another package of graham crackers, spread out throughout the day. Meal C, you can delete the beef steak and the chicken and rice and the pecans and you can add that lobster from Meal B

APOLLO 16, MISSION COMMENTARY, 4-24-72, CST 0919, GET 165:36 CM-150/2

CAPCOM                    Okay, Ken, we got that.  
CASPER                    Okay. That should finish filling that  
square, okay?  
CAPCOM                    Hey, Ken, how's the air-to-ground been  
this morning? Has it been a lot of noise on it or has it  
been clean to you?  
CASPER                    Just as quiet as ever. Beautiful comm.  
CAPCOM                    Okay.

END OF TAPE

SPEAKER Roger been clean to you.  
CASPER Just as quiet as ever. Beautiful calm.  
CAPCOM Okay. CASPER Houston could you give us a retract on the mass spec boom 20 seconds, that's a change 20 seconds.  
CASPER Okay, this is 20 seconds. Coming in now. It's off.  
CAPCOM Roger.  
CASPER Hank where is that extra crater that you said they had down there?  
CAPCOM What was that Ken?  
CASPER Said something about an extra crater down there. Well, I've lost it now.  
CAPCOM Oh, that was between double spot or where the LM was and down to the south towards Stone Mountain, as they were coming back from the surface, it was very apparent there was a very large depression subdued crater. There was a some they estimated 300 meters of maybe even larger in diameter.  
CASPER Okay, I guess I looked at the wrong place. I looked short of the landing area.

END OF TAPE

CASPER Henry, do you remember the little helmet-shaped area we had just south of the Rhipaeus Mountains?

CAPCOM Yes, sir.

CASPER In the - Showed up on the color differentials? Well, it's - does have a different color to it in the sunlight. It seems like these - the things that were showing up on those red and blue color differences are showing up more at the low Suns, because I could see the mare differences back by Lassell in low Sun and they don't show up so well, now; and now this one shows up very dramatically as a little piece of - out here, and it's just a little tanner than the rest of the mare.

CAPCOM That's a (garble). Kind of interesting to find out that the color's different there than its surroundings.

CASPER Yeah, and the texture is a little different, too. I've got the binocs on it now. The mare has a large number of very small pits in it, as well as - it's almost a random distribution of crater sizes. This little patch of ground has, oh, I guess about the same distribution as the larger craters, but the little pits don't show quite as much, and it has a ropey texture across the top, not as ropey as a (garble) flow or anything like that, but just kind of has a little pattern to it. It has some linaments that run kind of - I guess that's sort of northwest; and it looks like it might be associated with these other little clumps of material that stick out around it here. And - I was trying to compare that to the Rhipaeus Mountains, and it looks like - the material looks the same. And another thing I'd never noticed before is that, looking at the Rhipaeus Mountains, here, I'm looking at the step of the eastern edge, and if you - remember the background Flamsteed, there's a little foot - a little toe - a ring - that goes around the inside, and the Rhipaeus Mountains all have that little toe. Now, whether that's a high water mark, or a second unit, it's hard to say. But all along the margin that I can see there's this little toe. And it seems to be at the same elevation. And that's true for some of the little patches that are a little further back inland. It looks like a break in slope and a change in color, both.

CAPCOM What else do you see in there?

CASPER I see that it's getting dark outside, and it's time for an eat period inside.

CAPCOM Roger.

CASPER Naw, it's - That's an interesting place, I just need to have more time to look at it.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 09:39 GET 165:56 CM152/2

CASPER                    And I'm all set up for the solar corona.  
The cameras are all set, checklist is complete, down to turning the tape on.

END OF TAPE

CASPER And I'm all set up for the solar corona.  
The cameras are all set. Checklist is complete down to turning  
the tape on.

CAPCOM Rog. Let's take time to eat then. I'll  
just check out with you here at LOS.

CASPER Alright sir. Thank you. Maybe everybody  
else in the world knew about that little tow around the Rhiphaeus'  
mountain. I just - - I never heard anyone mention that.

CAPCOM Roger. That sounds interesting.

CAPCOM Crew, the boys in the back room have  
been eagerly obsorbing your remarks the last couple of days.

CASPER Yeah, but all the questions they ask  
I can't answer.

CASPER You know Hank, one of the things I was  
thinking about last night that might help remember a lot of things  
we've seen. Do you suppose there's a - - any dak film that I  
could use to say set +0 look out the window and I'll maybe if I  
can maybe just tape the DAC up somewhere. Let it take a one  
frame per second strip or something that would give us some  
reasonable overlap around the lighted part of the Moon.

CAPCOM Okay. Ken we'll take a look at that.

CASPER I think I can probably take the camera some-  
where so it would have a few - - approximately the same as what  
we've been seeing.

CAPCOM Casper no need to acknowledge - - your  
consumables look good. And on the RCS we're making a little  
money. We're about 188 pounds down above the rescue red line.

CASPER Okay. That sounds good.

END OF TAPE

CASPER Henry, are the surface guys out cranking up their little car yet?

CAPCOM Yes sir. They got out about 30 minutes earlier and they're moving on out.

CAPCOM Casper, Houston. John and Charlie are powering up the LRV now, and FAL says your clear to use magazines EE and KK at the present there unschedule.

CASPER EE and KK. Okay, what kind? Are they CEX.

CAPCOM Both of those are CEX.

CASPER Okay, and I'll - I'll just use the settings off the photo wheel the same as we used for the 250.

CAPCOM That oughta work out okay, Ken.

CASPER Okay, thank you.

CAPCOM Casper, we've been noting a little oscillation in that high gain in acquisition and we're wondering if you were noticing that discrepancy between the angles and the knobs and when you're in the manual mode. It appears to us you may be off a little bit in yaw.

CASPER Okay, I'll - I'll set them - I've been setting them on the dials rather than on the knobs.

CAPCOM Right, that's preferable to use the meter there.

CASPER Okay.

CAPCOM Is that dial for setting the yaw, is it loose?

CASPER No. No - uh uh. It just has that bias. It had it during - I guess it was the last time we were out there in the bird before flight for some tests, I noticed that it had a difference in reading. I can't remember now what the occasion was but I know that that - the biggest error is in the pitch channel rather than the yaw channel.

CAPCOM Okay, we copy.

CASPER Do you have a procedure you'd rather have me try at acquisition to help out?

CAPCOM Okay, if you see the signal strength oscillating a little bit, I guess the best procedure is to go to wide and wait.

CASPER Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4-23-72 GET 166:29 CST 10:09 CM-155/1

CAPCOM                   CASPER we're about 3 minutes from LOS,  
everything's looking good. The laser's degrading a little  
more but other than that, everything's okay.

CASPER                   Okay. I'll see you on the tuther side.

CAPCOM                   Alrighty.

END OF TAPE

CASPER Hello Houston, are you there?  
CAPCOM Hello CASPER, how's it going?  
CASPER Oh, pretty good. Got our solar corona done and I got a little 16 millimeter strip going, unfortunately, I missed the first couple of minutes while I was changing mags and you'll have pretty close to a full rev. This has turned out to be a -- I was looking through the flight plan to see a good rev and looks like this has got the hatch window pointing almost straight down and it's probably the best rev we got going.  
CAPCOM Okay, do you see anything worth talking about there before AOS?  
CASPER No sir, I spent all my time getting the camera set up.  
CAPCOM Roger, John and Charlie are at North Ray now and boy is that a big hole.  
CASPER They have any trouble getting up there, I guess not.  
CAPCOM Negative, they wizzed right on up there, unfortunately, they're not in a position they can see the bottom and it looks like they might have to fall in it first.  
CASPER Well, let's not get that picture.  
CAPCOM Roger, and also I was surprised, they didn't see any evidence of bed in (garble) -- in the crater anywhere they looked.  
CASPER I don't see any from here either. It looks like a little slumping but that's all.  
CAPCOM I guess those little things we saw in the photos just fooled us. It turns out that there was a little black spot on the east rim that was in the photo was really there. It turns out it's one huge dark colored rock.  
CASPER Is that right. Wonderful. They're going to chip it and get a piece out of the center. Huh?  
CAPCOM Well, we wanted them to turn it over, but they decided against it.  
CASPER Did they make any comment on what the material looked like on their drive up to North Ray?  
CAPCOM Most of it appeared to be breccia, however they did pass one that was (garble) looking thing that we probably saw our first basalt.  
CASPER It still looks like to me that that path they drove up on is part of all that furroughed Descartes unit. Hank would you give me a call at time 39, please?  
CAPCOM Okay, will do. And could you give us auto for the high gain?  
CASPER Thank you (garble) might have to stop again. You got it.  
CAPCOM And, Ken, if you like, I can go ahead and read up your plane change PAD.

APOLLO 16 MISSION COMMENTARY 4-23-72 GET 167:15 CST 10:58 CM-156/2

CASPER Okay, let me -- let me do a couple of more cleanup chores and I'll be ready to copy.

CAPCOM Okay and they're just putting the finishing touches on the flight plan change.

CASPER Okay.

CAPCOM CASPER if you'll give us ACCEPT, we'll send up your state vector and target load.

CASPER Okay, you have it.

END OF TAPE

CASPER My water spout looks like a Christmas tree ornament. It's actually very pretty, gotta a nice big bubble of water about an inch and a half in diameter sitting there on it just looking at me. And it's just as round, it looks like the cartoons of the jello that all the little mice play in.

CAPCOM Roger.

CASPER And, Hank I took a couple pictures on frame ZZ, that's frame numbers 22 and 23 of that water bubble so that the folks can see what we're talking about when we say that that gas separator has a big bubble on the end of it.

CAPCOM Roger.

CAPCOM Casper, the computer's yours.

CASPER Okay, be with you in - Okay, that's in block and you remember the guys, I think the folks from Marshall were saying that they thought that if you had a bubble of water and you hit it with another bubble in the - in zero G that one bubble ought to go through the other one.

CAPCOM Roger.

CASPER Seems like they said something like that. I don't remember all the details but I thought here was a good chance, I had one bubble, I try a second one and I put the water gun on it and from where I was standing I really couldn't see all the dynamics but it looks to me like it's splashed out the back side and the bubble was still intact on the front, whether it went through or whether it had a reflection that bounced off the other side, I can't really tell. It did develop some air bubbles inside of the big bubble so there maybe some interesting dynamics there.

CAPCOM Hey, that sounds real interesting.

CASPER Okay, I got my toys put up now and I guess the next thing in order is to copy a little plane change pan. Huh?

CAPCOM Roger. If your ready to copy.

CASPER Yes, sir.

CAPCOM Okay, LOPC-1, SPS G&N 38585 plus 045 plus 102 169 17 39 49 minus 00015 minus 01247, all zips, attitude is all zips, 0 pitch for roll, pitch, and yaw, noun 44 00 645 plus 00553, 01247, 007, 01130. The rest is N/A. Sirius and Rigel 197 240 301, 2 jetts 16 seconds, quad Bravo and Delta. Other high-gain angles for AOS in burn attitude pitch plus 13 yaw plus 258.

CASPER Okay, I copy LOPC 1, SPS G&N 38 585 plus 045 plus 102 169 17 3949 minus 00015 minus 01247, all zips, attitude is all zips, 00645 plus 00553 01247 007 01 130. Sirius and Rigel 197 240 301, 2 jetts for 16 seconds on Quads Bravo and Delta. High-gain angles at AOS pitch plus 13 yaw plus 258.

CAPCOM Good readback Ken.

END OF TAPE

CASPER Hank, we didn't say anything about this VERB 48 at 167:20, but I assume we meant to delete that.

CAPCOM I called that up to you, Ken, and I thought you got that. You acknowledged it.

CASPER (Laugh) Okay. Well, that's another one on my score, then.

CAPCOM Casper, we've done past your 39; it's 40 now.

CASPER Oh, okay. Thank you.

CAPCOM Sorry about that.

CASPER Ah, that evens the score!

CAPCOM Roger. (Laugh)

CASPER That's not fair. I was really going to - I really did forget, because I was going to, I was going to engage you in some verbal discourse to distract you so that you would let me forget it. Going to redeem myself.

CAPCOM (Laugh) Roger.

CAPCOM I had a diversion down here. We're fighting the Flight Plan.

CASPER (Laugh)

CAPCOM And, Ken, we'd like to get your Flight Plan update up to you; and would you prefer to do it after your visuals or start on it now?

CASPER Oh, let's see. How much time have I got? Probably I'd just as soon start now.

CAPCOM Okay. Why don't we get going with it, then? Okay, the first change comes at 168:05.

CASPER Okay.

CAPCOM At 168:05, Mapping Camera Off, T-Stop; VERB 49 Maneuver to P52 Attitude. That attitude is 142 250 042. Mapping Camera Standby - that should be about 30 seconds - about the time you do that maneuver. Image Motion Off?

CASPER Rog.

CAPCOM Laser Altimeter Off - And that's a Verify. Mapping Camera retrack. X-ray standby. Mass spec ION source off, Mass spec experiment standby and there's a caution; wait 5 minutes before retrack. Mapping camera, laser altimeter cover, closed. ALPHA particle X-ray cover, closed. Gamma ray retrack, mass spec retrack, enable all jets.

END OF TAPE

CAPCOM                   Gamma Ray retract, mass spec retract,  
enable all jets.

CASPER                   Okay, just a second, I'll read it back to you.  
How about if I read that back to you after I pass the landing  
site.

CAPCOM                   Okay.

CASPER                   Is that going to crowd us for time? You  
got a better feel for it than I have.

CAPCOM                   I don't think so Ken, if we can get right  
on it right after the visual.

CASPER                   Okay.

CAPCOM                   Ken, John and Charlie are still at North  
Ray and they have found some basalt clast.

CASPER                   Very good. Around the outside, or up on the  
rim?

CAPCOM                   They're still on the rim.

CASPER                   The thing that I find most puzzling about  
North Ray is that as the albedo comes up now I can see -- as the  
sun comes up the albedo chain shows up and I can see the rays  
around it a lot better now and the rays lay on top of that material  
that seem to run -- that they drove up on. Al, I take it back,  
it looks like there's a little tone to that material -- it's  
probably about where they drove. It doesn't appear to be as  
white as the stuff just a little bit further to the east but  
all that material down to the east and all the stuff that goes  
over -- goes over to Ravine, all look like the same stuff and  
looks very similar and character to Smoky. I see no evidence  
of rays in North Ray except for some blocks on the sides. They're  
probably just slump blocks and slump patterns and taking a quick  
comparison with South Ray, I'm not so sure South Ray is much  
different. Okay, I'm ready to go back to copying updates.

CAPCOM                   Roger. You want to read back what we just  
had there for 168 05?

CASPER                   Okay. Let's see, 168 05. Okay, yeah, I  
wanted a question, I had a T stop time for the camera of 0541  
and you just gave me 05. Do you want me to stop it at that or  
do you want me to go on to --

CAPCOM                   0541 is the correct stop time, we just --  
this is just putting in words, what goes along about that time.

CASPER                   Okay, and then the VERB 49 to a P52 attitude  
which is 152 250 042.

CAPCOM                   Correction on that -- that's 142.

CASPER                   Mapping camera standby. Image -- what did  
I read to you 142 250 and 042.

CAPCOM                   That's correct.

CASPER                   Okay. Then it's mapping camera to standby,  
that's -- after 30 seconds after we get off and IMC off, laser  
altimeter verify off, mapping camera retract, X-ray to standby,

CASPER mass spec ion source off, mass spec experiment to standby. Wait 5 minutes before retraction then I can go ahead and close the mapping camera laser altimeter cover. The alpha X-ray door can be closed and the gamma ray can be retracted and after the 5 minutes, I can retract the mass spec, then I will enable coupled thrusters.

CAPCOM Good readback. At 168:15 H2 PURGE line heaters on. P52.

CASPER Okay, 168 - wait a minute. Say that again, Hank.

CAPCOM Roger. The H2 PURGE line heaters on at 168:15 and following that, P52 option 3, and then an option 1. And you're going from landing site to the burn orient.

CASPER Okay, that will be in option 1 and then an option 3.

CAPCOM It would be the option 3 and then option 1.

CASPER Okay.

CAPCOM And just a reminder to use SCS for that. I guess you got that down as a standard procedure now.

CASPER Okay, it's a good reminder nevertheless.

CAPCOM Now, what we're going to do here, Ken, is we're, your going to have to get a scratch pad now and there's just no place in the flight plan we can do this conveniently, and we'll just give you times and things to do that fill in the gap between 168:30 and 172:30, and if you want to do that, or get your pad out, I'll read these things to you.

CASPER Okay, I got a pad. Do you think we know enough to, right now to be pretty much sequential or do I need to leave spaces for alterations. You know, we've got some of those real time checklist sheets in the updates booklet -

END OF TAPE

CASPER Right now will it be pretty much sequential or do I need to leave spaces for alterations?

CASPER You know we have some of those realtime checklist sheets in the update book, let's see if that's appropriate.

CAPCOM I think that's probably a good thing to use.

CAPCOM And Ken, I think we've got a pretty good handle too, on what should happen in sequence, so you wouldn't want to leave too many spaces.

CASPER Okay, well, we've got a lot of these flight plan update sheets so why don't I use them. And I'm ready - let me mark this so I can always find this page. Just a second, before you read it to me.

CAPCOM And Ken, we don't plan to update the platform before the burn, just for your information.

CASPER Alright, I've got my paper in hand, ready to copy.

CAPCOM Okay, time 158 30, configure for urine dump, 168 37, P30, verb 49 maneuver to LOPC1 attitude.

CASPER Okay.

CAPCOM 168 40, page 2 in 02 fuel cell purge, waste water dump and urine dump.

CASPER Okay, and you want me to dump them both at the same time, right?

CAPCOM That's affirmative. And at 168 50, terminate waste water dump at 10 percent and H2 purge line heaters off.

CASPER Okay.

CAPCOM Okay, they couldn't work that mass spec dump in there, Ken. They tried, but they couldn't. 168 55 pre SPS SIM press. Set DET counting up to LOPC 1. Secure equipment for LOPC1.

CASPER Okay.

CAPCOM At 169 05 P40, at 169 13 AOS and that will be those angles you had, PITCH plus 13, YAW, 258. At approximately 169 17 is LOPC1. And we hope we'll have good lockup, but there's only about 4 minutes, and we hope we'll be locked up so we can watch. At 169 20 -

CASPER Okay.

CAPCOM P00, okay, and also I guess I should tell you, you can use the burn table for that LOPC burn, it's on page 223 of the flight plan. That's got all your burn rules and so on.

CASPER Alright, let me check that real fast.

CASPER Okay, those look like familiar rules.

CAPCOM Okay, and at 169 25, we'll uplink you a liftoff REFSMAT. And at 169 30, your post SPS burn SIM press. And it still leaves a gap there of about 3 hours and after

CAPCOM LOPC 1, we don't want to clutter you up till we get through with that, we'll go ahead and give you the rest of things that fill in here.

CASPER Okay, I'll still need plenty of time to get the cockpit squared away for rendezvous.

CAPCOM We plan to give you lots of time for that Ken, you want to read back what you've got there, just to make sure we agree.

CASPER Yes sir. Let's see here, have we got anything coming up here that we're supposed to be watching before I read it back?

CAPCOM I'm watching your mapping camera.

CASPER Okay, I'll read back 168 30 configure for urine dump, 37 do P30, verb 49 to lunar orbit plane change number 1 attitude, at time 40 hydrogen and oxygen fuel cell purge, we turn heater on back here at 168 15. Okay, at 40 we also do waste water and urine dump. At 50 terminate waste water dump at 10 percent and turn the purge line heaters off, at 55 pre SPS SIM press, set the DET counting up and secure equipment. At 169 05 P40 at 13 it's AOS with a PITCH 13, YAW 256.

CAPCOM That's 258.

CASPER At 17 it's it's plane change 1 258. Okay, I've got that on the other pad too. Alright at 17 a plane change 1, I use the burn rules off page 223 at 20 I'll go to P00, at 25 you give me an uplink of ascent REFSMAT. At 30, I'll do the post SPS SIM prep.

CAPCOM Roger, and I guess we'll use your modified burn card with 509 et cetera.

CASPER Okay, and I'll start 509 right after my P52.

CAPCOM Okay.

CASPER And we'll do an SCS and then I'll call 509 and then I'll take 509 down and use the modified card where I started the gimbals, bring the bus ties on at 8 minutes.

CAPCOM That's a good plan, Ken. Where we're going to pick up the flight plan again is at 168 30 to start preparing for the rendezvous. And if you'll come 168 30 on to 175 hours, if you add 4 hours to all those times you're close enough that we can use them all the way through the rendezvous.

CASPER Alright, that's a help.

CAPCOM In other words, 168 -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 11:48 GET 168:05 CM161/1

CASPER                    Alright that'll help.

CAPCOM                    In other words 168:30 becomes 172:30 and so on down the line all the way through and even the liftoff time was within a minute or so, and ya'll always get an update on that anyhow, so this section of the flight plan will be good.

CASPER                    Okay. (garble) Alright sir, I guess I've got my work cut out.

CAPCOM                    And Casper, you're about 15 seconds from T stop on the mapping camera.

CASPER                    Alright, thank you. And it's off.

CASPER                    Okay, our maneuver is underway.

CASPER                    Mapping camera is coming to standby. IMC is off and barber pole is gray. The laser is verified off. The mapping camera is coming to retrack. Mark. The X-ray is in standby. The mass spec IN source is off. The mass spec experiment is in standby. (garble)

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 11:58 GET 168:15 CM162/1

CASPER Okay, I'm in SCS control, and I'm going to  
call P52.

CAPCOM Roger.

CASPER I must have one of the planets right up  
there above, right in that area too. Does that sound right.  
Mats around Munki.

CAPCOM I'll take a look.

CASPER Okay. Back and do an option 1 now.

CAPCOM Roger.

CASPER Okay, I have these numbers if anyone wants  
them.

CAPCOM We've got them.

CASPER Okay, I don't think those are worth torquing,  
are they?

CAPCOM Negative.

CASPER Yes, you have Jupiter in my field of view.

END OF TAPE

SC Okay, I don't think those are worth torquing, are they?

CAPCOM Negative.

SC Yes, you have Jupiter in my field of view, and all these little moons.

CAPCOM Roger.

SC He sure must be a long ways off cause even now, he's not very big. You can see his moons, though. That's about all you can tell from it. You know who he is.

CAPCOM Okay, Ken, for LOS, here, after you have exit that 52, we'd like you to check your boom complex.

SC Okay, standby and I'll be with you. Okay, I've got CMC mode on the optics on zero resolve, all that is put to bed, I'm going to start the 509. I'll look at the talkbacks first. Now, I got two of these things that show barber pole. Both the mass spec and the gamma ray.

CAPCOM Okay, we feel that both booms are not fully retracted, however, we do show them past the point where it's safe for a SPS burn, so, we'd like you now to take the -- deploy retract switches on both those to OFF.

SC Okay, they are safe for burns. I guess we ought to try that in sunlight.

CAPCOM Okay, Ken, we're about 3 minutes from LOS.

SC Okay, we'll go ahead.

CAPCOM In case we don't get COMM, before the burn, at this point you're go for the burn, the only thing we haven't done is look at your target load. You still have to enable the jets according to the flight plan and when you do your pre-SPS burn card on the SIM bay, you'll be turning the half part on X-ray off and go on to boost on the pan camera.

SC That's affirmative.

CAPCOM Ken, be sure you load your DAC before you load 509.

SC Okay.

SC I was going to try to let take a look at the vector P40 before we got to LOS.

CAPCOM Okay.

SC Okay, you've got it.

CAPCOM You have a good vector, Casper.

SC Okay, and I've got the DAC loaded.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 12:56 GET 169:14 CM164/1

CASPER Hello, Houston. How are you doing?  
CAPCOM Hello, Casper. How's it going? Are you  
all set up?  
CASPER All set to go. 509 is out and I'm in  
attitude, and we must be right, I'm going sideways.  
CAPCOM Roger.  
CASPER Counting down at 155 on my clock so I'll  
give you the final couple steps on VOX.  
CAPCOM Okay, Ken. We got data and everything  
looks good. You're still GO.  
CASPER Okay, thank you sir.  
CASPER Okay, 1 minute, the EMS is going to normal.  
Translation control power is ON. Translation controllers  
and rotation controllers are armed.  
CAPCOM Copy.  
CASPER The arm light is out, the SPS delta V  
thrust A is coming on. Mark. Average D is on, IPS look  
good. Ullage - good ullage, attitude good, engine enable.  
There's ignition, AUTO shutdown, okay, residuals, I have Y  
as minus .1, I'll give you the Verb 6 noun 20s and you can  
watch that while I turn the gimbal motors off. There's  
number 2 is off, number 1's are off, internal powers are  
OFF. Do you have the attitude, Houston?  
CAPCOM That's affirmative.  
CASPER Okay, I see that as no trim. My Delta  
VC was minus 9.1.  
CAPCOM Roger, 9.1.  
CASPER And I assume you're handling the DSE now,  
so -  
CAPCOM Yes.  
CASPER Looks like you got it.  
CAPCOM That's affirmative, Ken.  
CASPER Okay, bus ties came off normally.  
CASPER I noticed that when I set it up that  
just before putting them on in bus B or battery B, it was  
reading a little bit lower than the others. It was reading  
about 34.  
CAPCOM That's Roger, Ken and we're just about  
ready to abet B charge. I'll give you a call, and if you'll  
give us ACCEPT, we're ready to uplink the REFSMMAT.  
CASPER You have ACCEPT. And you want these  
fuel readings? I'm not sure they're valid, but it's 31.8  
oxidizer, 32.8 on fuel and unbalance is now showing as a  
decrease of 275, and we made the burn in the 6 position with  
secondary valve and normal position.  
CAPCOM Roger, copy.  
CAPCOM Casper, the computers yours, and we did  
your verb 56 for you and we'd like you to start a bat B charge.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 12:56 GET 169:14 CM164/2

CASPER                    Okay, let me finish my SIM bay configuration, and then I'll be right with it.    Okay, you'd like to have a battery B charge.

END OF TAPE

APOLLO 16 MISSION COMMENTARY, 4/23/72, 13:06 CST, 169:24 GET, CM-165/1

CASPER You guys are awful quiet, Henry. You must be plotting.

CAPCOM Roger. We got some more flight plan changes for you. Let me just read you the first one here and let you get going. We want you to do a VERB 49 maneuver to the P52 attitude and it's about a 15 minute maneuver and we want you there about 46, so why don't you go ahead and load it up and I'll give you the angles there. 180 075 345.

CASPER Okay. We'll need 0075 and 345. And can we put the computer in block.

CAPCOM The computer is yours.

CASPER Okay, Hank. What time do you need me there?

CAPCOM Roger. At 46. It looks like you're going to make it.

CAPCOM And you might keep an eye on the middle gimbal angles on this thing. We're going to watch it too.

CASPER I can't watch this thing (garble) more than a minute.

CASPER Oh, it should be clear. It's got a good bit of roll to go with that yaw. But I will keep looking around.

CASPER Okay. Why don't you read on.

CAPCOM Okay. 169:46 P52 option 1, and we want a pump start to the ascent orient.

CASPER Okay. This time you want to do a pulse start, P52 option 1 and 46.

CAPCOM Roger. And following that, open the alpha particle X-ray cover and then turn the X-ray on.

CASPER Okay. Then open alpha X-ray cover and the X-ray to ON.

CAPCOM Roger. 169:51, VERB 49 maneuver to molten point attitude, to be there at 170:20, and that's about a 9-minute maneuver. The molten point attitude is 225 233 358.

CASPER Okay. At time 51, I go to molten point attitude 225 233 358 and I have to be there by 170:20.

CAPCOM Roger. And the high gain to auto at your convenience.

CASPER You got it.

CAPCOM Okay. And following that maneuver at that same time, go to the experiment checklist, Gegenschein pass number 2, page X2-3, steps 1 to 4.

CASPER Okay. That's experiment checklist page X2-3 gage on past 2.

END OF TAPE

SC Okay, that's experiment checklist page XII-3 gegenschein past 2. They give you some step numbers. Does that mean I don't do the whole pass?

CAPCOM Well, we want the photos to start at 1728.

SC Okay, standby a minute. Let me get to that.

CAPCOM What that's doing, Ken, is that's one of those things where you maneuver around to the marking point to the anti-solar point and to the -- and do those frequencies. So, steps 1 to 4 gets you a crater molten point frequency and you got to do a little maneuver to the anti-solar point.

SC Okay, but I'm going to do the whole sequence. When you read steps, I thought maybe there was something I was suppose to leave out. Okay. So, all we need is another set of attitudes and sometimes. Now let me have this molten point time that has to be done no earlier than some given time.

CAPCOM Roger, Ken. We want you to start at 170 28. 170 28.

SC I will certainly try. But that's also the earliest, is that correct?

CAPCOM That's affirmative.

CAPCOM Follow in that sequence at approx -- well, that time is all wrong here but we want you to do a VERB 49 maneuver to the antisolar point. That's about a 5 minute maneuver and the attitude is 279 223 356.

SC Oh, boy. Hank, can we stick a 5 minute of maneuver as long as I'm in there, I might as well going to make it. Do you know why we're changing the roll left that much? Last time, we didn't change the roll at all. We just made a little pitch maneuver down there.

CAPCOM Okay, FAL will check that, but that is the same place found on page -- on the checklist. The next step.

SC Okay.

CAPCOM They say here if that is correct that they want you at that attitude by 150 36 but as far as I'm concerned, you just step to the sequence.

SC That's the only thing I can do, Hank.

CAPCOM Roger.

SC What was that target time, again?  
170 36?

CAPCOM That's affirmative.

SC Okay.

CAPCOM You won't be there by then if that's -- oh, I see. FAL said that what they're trying to do is combine deep space measurement with the -- for these photos.

SC Okay.

CAPCOM And you're not going to be at that attitude by 36. That'll be more like 38.

SC At the best, yes sir.

SC Now, we can put in a higher rate. That's up to you folks. Is it worth the gas?

CAPCOM You got the gas if you want to do it.

SC Well, I'd like to get as much data as I can, Hank, I don't know how to access what's worth keeping a little RCS for a rendezvous as opposed to --

CAPCOM Okay, press ahead and use the gas. Go a higher rate and let's get these things.

SC Okay.

SC I'll set the -- right after -- I get to the molten attitude, I'll change the DAP to a high rate.

CAPCOM Okay, is there any question on that gegenschein thing there, Ken?

SC No. I'm just looking it over. Just a second.

SC Okay, I'm on my way to the P52 attitude which we're going to get at -- I guess, here at daylight. That should be no problem. That's why we're going to do a post work and I'll open the out X-ray covers and get the X-ray on, and then at times 51, I'm going to try to do a VERB 49 to the molten attitude which is 225 233 and 358 to be there at 170 20. I'll then do those pictures and try to start them at 170 28. By getting an attitude, I'm going to change the DAP to 10102, then do a maneuver to the anti-solar point at 279 223 and 356. In those pictures, you begin at 170 36. At the conclusion of that sequence, I'll return the DAP to 10101.

CAPCOM Okay, that sounds, Ken, and at 171 hours we want to turn the X-ray to standby and close the alpha particle X-ray cover.

SC Okay, at 171, you want X-ray to stand by and close the alpha X-ray cover.

CAPCOM Roger. That's perceptive order.

SC Roge, thank you.

SC Okay, is there something that comes after that? Do I go to another attitude or what?

CAPCOM Standby a minute, Ken.

SC Okay.

CAPCOM Okay, Ken, following this, we want you to -- this attitude will be good all the way up to 172 30, and we want you to get an E period in there and at 172 15, do a P52.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 13:16 GET 169:34 CM-166/3

SC Okay, just a second. You caught me without my book.

SC Okay, Hank. Say again those events?

CAPCOM Okay. The attitude that you're in at the completion of the gegenschein will be good for that time until we pick on the -- in the flight plan at 172 30 where we marked it up and the only thing we want you doing in this period is to eat and at 172 15, do a P52.

SC Okay, I'll eat to a P52 at 172 15 that would be in flight plan at 172 30.

CAPCOM That's affirmative and for information, the next AOS --

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 13:26 GET 168:44 CM167/1

CASPER Okay, I'll eat, do a P52 at 172:15 and be  
in the flight plan at 172:30.

CAPCOM That is affirmative, and for your information  
the next AOS is at 171:14.

CASPER Okay, thank you sir.

CASPER Okay, Hank. I got 23 frames used on magazine  
Z-Z. I assume that's enough to get me through this new sequence,  
right?

CAPCOM That's affirmative. That should be a 7 frame  
sequence.

CASPER Okay.

CAPCOM And, Ken, for planning purposes, we're going  
to delete your suit donning for the rendezvous, so you won't have  
to be worried about that.

CASPER Okay, alright. That'll unclutter the time  
a great deal, thank you.

CASPER Can I go ahead and open the Alpha cover?

CAPCOM Standby.

CAPCOM Roger, Ken. Go ahead.

CASPER Okay, that baby's open.

CASPER That ought to get your attention, shouldn't  
it?

CAPCOM Roger.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 13:37 GET 169:54 CM168/1

CASPER Okay, the X-ray is on.  
CAPCOM Copy.  
CASPER Well, we finally got a little serendipity,  
Hank.  
CAPCOM How's that?  
CASPER Almost in the right attitude to start with.  
I know, and with you guys in the loop that's not luck. It sure  
is nice to get a - get somewhere more than a minute before you  
have to be there. And we're all set up, I got the window shade  
up, and the camera installed, and we're all ready to go.  
CAPCOM Casper, Houston. We'd like you to con-  
figure for SIM bay jett.  
CASPER Okay. got it.  
CAPCOM And Casper, could you reacquire on the high  
gain, we're having a little trouble. PITCH minus 30, YAW 80.  
CASPER How's that?  
CAPCOM Hey, that looks good.  
CASPER Hank, just out of curiosity, all this  
lighter material that's sticking up through the mare down  
here, have that same little bench on it that I described at  
Riphaeus Mountain -

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 13:46 GET 170:04 CM169/1

CASPER Hank, just our of curiosity, all this minor material is sticking up to the mare down here, have that same little bench on it that I described at Refuse Mountains. That includes some of these circular craters that are sticking up.

CAPCOM Roger. That sounds pretty interesting.

CASPER Has both a different color and I think it has a different slope, but it looks just like a high water mark on it, because everything around here is uniform.

CAPCOM Roger. Are you talking about the swirls?

CASPER Swirls, no sir. I'm talking about these little benches that are on the side of every piece of material that sticks up through the mare surface.

CAPCOM Roger.

CAPCOM Casper, Houston. After you get the alpha partical X-ray covered door closed at 171 hours, you can go back to coupled RCS.

CASPER Okay, let's see, after I close the door at 171, then you want me to go back to couples.

CAPCOM We want you that way at LOS so if I don't get some good tracking on you.

CASPER Okay.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 13:56 GET 170:14 CM170/1

CASPER Henry?  
CAPCOM Did you call, Ken?  
CASPER Yes sir, I'd like to verify what I'm supposed to be pointing at. It doesn't look like - we got the camera in the 30 degree position according to the checklist and it was my understanding that mark on my checklist on that star chart was the molten point, and it doesn't appear to me that my camera is pointing at that spot.  
CAPCOM Stand by. Okay, the checklist calls for the camera in the X position.  
CASPER It looks to me that my camera is pointing about Gienah.  
CASPER Oh, there it is, okay, now I'm glad we checked that.  
CASPER Hank, it still looks to me like I'm pointing closer to Spica than I am Antares.  
CAPCOM Ken, FAO verified the attitude, they say it's good.  
CASPER Okay, that's fine then.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 14:06 GET 170:24 CM171/1

CAPCOM           Casper, Houston. We're a little over 2  
minutes from LOS, and everything is looking good. INCO's got  
your recorder.

CASPER           Okay, thank you very much.

END OF TAPE

CASPER Hello, Houston.  
CAPCOM Hello, Casper. How's it going?  
CASPER Oh, we're still here. Done all of our chores. Got your SIMBAY buttoned up, and we're in couples. And in lieu of anything they just switched to wide jet bands, just there didn't seem like there way any reason not to.  
CAPCOM Okay.  
CASPER I understand from your comment last time, Hank, that there are no other activities tentively scheduled until the rendezvous sequence starts, so I can go ahead and start stowing things and getting set up for that. Is that correct.  
CAPCOM Roger, Ken. The only things thats scheduled is that P52 about an hour from now.  
CASPER Okay, and I got your P52 in the last pass, if that'll help, and I used stars 27 and 31, and the torquing angles were plus .108 plus .061 plus .001 and I torqued that at time 170:59:30.  
CAPCOM Roger, copy. Okay, you can delete the P52 announcement now and then.  
CASPER Okay. Thank you. And the plan is still to do the nominal rendezvous sequence up through where you get some of the basic equipment over and then power down and we'll jettison the LM tomorrow. Is that correct?  
CAPCOM That's affirmative, Ken. That's still the plan.  
CASPER Okay.  
CAPCOM Casper, Houston. We're riding right at the edge of the high gain scan limit. We would like for you to roll left 15 degrees.  
CASPER Okay. Roll left 15.  
CASPER Okay, Henry. Is that angle going to be alright now?  
CAPCOM Roger, Ken. That's good.

END OF TAPE

CAPCOM Casper, Houston.  
CASPER Yes, sir.  
CAPCOM I've got some updates for you in the flight plan back in table 215, the transfer after docking table. Table number 2-8, page 2-15.  
CASPER Okay. Could you stand by for just a minute.  
CAPCOM Will do.  
CASPER Okay. Where is this now, Hank.  
CAPCOM Roger. In the table under item number 8.  
CASPER Well, could you tell me the page again?  
CAPCOM Oh, it's page 2-15, it's transfer after docking table, table 2-8.  
CASPER Okay.  
CAPCOM Okay. Under item 8, we want to delete the LCG plug, the PGA electrical connector covers and the neck ring dust covers. Those three items will be on the suits and delete the DSEA and they'll take care of that tomorrow.  
CASPER Okay. I take it from that they're coming up unsuited.  
CAPCOM They're going to take their suits off in the LM, Ken.  
CASPER Oh, I see. Okay.  
CAPCOM And the rest of these deletions are because they'll be taken care of tomorrow also. Delete item number 12 and on the next page -  
CASPER Okay.  
CAPCOM - item number 15, delete the second and third lines. And delete items 26, 27, and 28.  
CASPER Okay. Let's see if I got all that now. I got under item 8, delete the LCG plugs, the PGA market contents, the neck ring dust covers and the DSEA. I deleted item 12, I deleted the second and third lines of item 15, I deleted number 26, 27 and 28.  
CAPCOM That's affirmative.  
CASPER Okay.  
CAPCOM And, Casper, I have two P24 pads for you whenever you're ready. The first one is at 173:20 in the flight plan.  
CASPER Okay.  
CASPER This is after the numbers have been changed right?  
CAPCOM That's affirmative.  
CASPER Okay, how far - let me see here how far ahead I need to change the numbers. I better do that right now so we don't get - that first.  
CAPCOM Okay. That's at the old 169:20.  
CASPER Well, we're going - let's all talk in the

APOLLO 16 MISSION COMMENTARY, 4/23/72, 15:05 CST, 171:22 GET, CM-173/2

CASPER                   real GETs and I'll change my numbers in the  
book right now.  
CAPCOM                   Okay. 173:20.

END OF TAPE

CASPER Okay, I'll copy those numbers now.  
CAPCOM Okay, and all of these are at 173 hours plus Ken, so T1 is 173 plus 1502195221322220, south 10 nautical miles.

CASPER Okay, and I guess we've got another one over here at 173 50.

CAPCOM That's affirmative. They're all 173 for the first number. T1 is 3918440845484636, north 1 nautical mile.

CASPER Okay, for Descartes 1733918 4408 and 4548 4636, north 1, F1 173 1502 1952 213222 - that's 2220 for T3 and south 10.

CAPCOM Good readback, Ken.

CAPCOM Casper, Houston. for your planning, I don't know if it's been passed up or not, but no TV for rendezvous or docking.

CASPER Oh, okay. I hadn't gotten that.

CAPCOM The reason for that Ken, is that the television interferes with the LM comm, they've been having a comm problem there with their steerable.

CASPER Okay, well that's one less, big item to not have to unstow.

CAPCOM Casper, Houston. While you're working there, I'll just read you part of a little note I got from Baruch in the back room. He says that "We feel that your descriptions of the video targets have been very accurate and extremely significant. Also concern your comments on the FIK, the traverse planning troupes were very happy to have, and many of your comments were taken into consideration in planning EVAs 2 and 3."

CASPER Thank you, that's awfully kind.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 15:25 GET 171:42 CM-175/1

CASPER Hey Hank.  
CAPCOM Go ahead.  
CASPER How about giving me a call about 5 minutes  
before we pass over the landing site and about 5 minutes before  
hit the Rhiphaeus Mountains.  
CAPCOM Will do it.  
CAPCOM Ken I think you just passed the landing  
track.  
CASPER Oh okay. Well better luck next time.  
How about the Rhiphaeus Mountains then.  
CAPCOM Okay I'll give you a call 5 minutes prior.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 15:35 GET 171:52 CM176/1

CAPCOM Casper, Houston. You're approximately  
5 minutes from the mountain.

CASPER Okay, thank you very much.

CASPER Sorry about that.

CAPCOM What's that you're sorry about, Ken?

CASPER The camera got the (garble) mike caught in  
the (garble) on the back of the camera. I thought it was probably  
making a lot of noise at you.

CAPCOM We can hear the camera cycling.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 15:45 GET 172:02 CM177/1

ALL DEAD AIR

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 15:55 GET 171:12 CM178/1

CASPER Hank, before I throw out the electro-phoresis, I'd like to verify that that's still their intention.

CAPCOM Okay, I'll have them check on it.

CAPCOM That's still in the plan, Ken.

CASPER Okay.

CAPCOM Casper, Houston. I know you're going to love these words, but I've got one more flight plan change.

CASPER Okay (laughter) hang on a second and I'll be with you. Let me get things tied down. Well, it looks like that last month of training was well worth while.

CASPER Okay, Hank, read away.

CAPCOM Okay, the first one is at 173:50.

CASPER Okay.

CAPCOM Okay, does it say something there about a verb 49 maneuver to P52 COAS cal that's after that 173:55. Want to change that attitude to 180255357.

CASPER Okay, that COAS CAL attitude will be 180255357.

CAPCOM Roger, and the high gain angles are minus 75249.

CASPER Okay, minus 75 and 249.

CAPCOM Okay, next page 174:09, delete the con-figure for urine dump and the 82 purge line heaters on.

CASPER Okay.

CAPCOM Same page at the bottom, 174:28, delete the fuel cell purge and the dumps.

CASPER Okay, that's done.

CAPCOM Next page at 174:36, starting with CM4 TV bracket, delete all through down PGA.

CASPER Okay, I ought to be well ahead by then if you'd like for me to wear the suit, why, it's no problem. I'm not requesting to wear it -

END OF TAPE

CAPCOM That takes some time out after the docking,  
Ken. That hits that time line.  
CASPER Okay. Anything there is a big help.  
CAPCOM Okay, at 175:13 -  
CASPER Okay, I got those deletions. Go ahead.  
CAPCOM At AOS, we want to change the angles there  
to minus 75 249 and put their REACQ in wide. And this REACQ in  
wide is going to help the LM comm.  
CASPER Okay.  
CAPCOM At 177:19 -  
CASPER Say again the time.  
CAPCOM 177:19.  
CASPER Okay.  
CAPCOM Delete TV on. And anywhere in there you  
run across that TV, just delete it.  
CASPER Alrighty.  
CAPCOM And the last change is at 178 hours, at the  
top of the page.  
CASPER Okay.  
CAPCOM P20 option 5, minus X forward SIM bay attitude.  
I'll get you your deadband on that in a second. Following that  
Alpha particle X-ray cover open, Alpha particle on -  
CASPER Hey, give me a minus X. Start that whole P20  
thing again, Hank.  
CAPCOM Okay, it's P20 option 5, minus X forward.  
That's the SIM bay attitude.  
CASPER Okay. And you say you do not have a deadband  
yet.  
CAPCOM 3°.  
CASPER Say again.  
CAPCOM NOUN 79 will be a 3° deadband.  
CASPER Okay.  
CAPCOM Okay, Alpha particle X-ray cover open,  
Alpha particle experiment Alpha on, X-ray on, gamma ray deploy,  
mass spec deploy, and after the mass spec is deployed, mass specs  
experiment on, ion source stand by.  
CASPER Okay, got all that. P20 option 5, minus X.  
3° deadband. The Alpha door comes open the Alpha comes on and  
the X-ray comes on. The gamma goes out, the mass spec goes to  
deploy, the mass spec experiment comes on when it's deployed,  
and the ion source is stand by.  
CAPCOM That's a good readback, Ken. That should  
take you on up past rendezvous, and docking.  
CASPER (Laughter) Do you care to have a little  
friendly wager.  
CAPCOM Negative, cause I just got another change,  
if you'll flip back a page to 177:55.  
CASPER (Laughter) Okay, go ahead.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 16:02 GET 172:18 CM179/2

CAPCOM We want to delete the VERB 49 maneuver to the LM jets since we're not doing that tonight.

CASPER Okay.

CAPCOM And that's about revision U-Uniform, I'll have Victor for you here shortly, probably.

CASPER Okay, no sweat. Whenever you get it, give me a call. Meanwhile I'll be picking up toys here.

CAPCOM Casper, you're looking good going around the hill, and INCO has you recorded.

CASPER Okay, thank you very much. I'll see you in a few minutes.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 16:53 GET 173:11 CM-180/1

CASPER Hello Houston. How do you read?  
CAPCOM CASPER, Houston. Reading you weak and  
noisy.  
CASPER Hello Houston. How do you read?  
CAPCOM CASPER, Houston. I'm reading you very  
weak with lots of noise, over.  
CAPCOM CASPER, OMNI delta.  
CASPER Houston, can you read yet?  
CAPCOM CASPER, Houston. Reading you very weak  
and if you read go OMNI delta.  
CASPER Houston, can you read me?  
CAPCOM CASPER, Houston. How do you read?  
CAPCOM CASPER, Capcom.  
CASPER Houston, do you read CASPER?  
CAPCOM CASPER, Houston. Reading you very weak.  
Coming up on 10 seconds to P2.

END OF TAPE

CAPCOM Casper, OMNI Delta.  
CASPER Okay. How about that one?  
CAPCOM Hey, you're doing a lot better now, Ken.  
We had a bad antenna, I guess, on this acquisition.  
CAPCOM The marks should have gone on the tape recorder, though.  
CASPER Okay. I -- the tape recorder wasn't running so I started it and I hope they're ready for you.  
CAPCOM Thank you.  
CAPCOM Ken, for your information, the LM is not going to do a P22.  
CASPER Okay, thank you.  
CAPCOM Casper, Houston, it looks like we got about 10 minutes here is all that's free. I got flight plan change vector here.  
CASPER Okay.  
CASPER Let me make one quick note on what I marked on there on S-1 and I'll be with you.  
CAPCOM Okay.  
CASPER It's an awfully big target to be marking on so, I picked a little target on the side of it.  
CASPER Okay, and I'm ready for a change vector.  
CAPCOM Okay, and for your information, Ken, the stowage for the atoms transfer from the LM to the CSM will be nominal. The first change is at 179 20. And I guess we should have brought that page just to add to 4 hours too.  
CASPER 179 20.  
CASPER I did that. 179 20, go ahead.  
CAPCOM Okay, just to make sure we're at the right place at the old 175 20.  
CASPER Yes, sir.  
CAPCOM Okay. At that place --  
CASPER A big blank area right now.  
CAPCOM Right. At that place put on LM request, connect LM CM umbilical and transfer power to the CSM.  
CASPER Okay. On LM request, connect the LM CM umbilicals and transfer power to the LM at 179 20.  
CAPCOM Roger. At 179 45, close LM hatch.  
CASPER Go ahead.  
CAPCOM Hatch installation decal, LM tunnel (garble) valve to LM CM Delta P, tunnel lights, off.  
CASPER Okay, you want --

END OF TAPE

CASPER Okay, you want to close the LM hatch, and I take you want to install the command module hatch, and we'll do a LM CM Delta P for the position and the tunnel lights off.

CAPCOM Roger, and delete the update block, the wave lock and the VERB 40 loads -- VERB 48 loads and right under that put mass spec ion source, ON.

CASPER Okay, All right, go ahead.

CAPCOM That's right under where I had the VERB 48. This is 480 hours, but just to get it in there. Mass spec ion source, ON, VHFAMB, OFF, center, and begin the (garble) period.

CASPER Okay. Now somewhere, I need to load the LM weight into the CS added -- added to the CSM weight or at least have the LM weight on there for the DAP. Let's see -- that's already taken care of.

CASPER You going to get me a LM weight some time earlier so we'll be covered.

CAPCOM Okay.

CAPCOM Okay, that will occur right after docking, Ken.

CASPER Yeah. I guess.

CAPCOM Okay, okay, You can start turning pages now, I guess, and we want -- at the old 176, we want to scrub that whole page. Actually, we're going to scrub everything from 176 on up through 181 -- well up to 181. So, page 176, 176-30, scrub those two columns, on the next page of 177 the one --

CASPER You're not going to want to use them again tomorrow?

CAPCOM Negative. They say not.

CAPCOM Don't scrub them too heavily.

CASPER Okay, I don't want to copy that all over again tomorrow.

CAPCOM At this point, let's just skip over lightly.

CASPER (garble) do you (garble)?

CAPCOM Okay, anyhow, going over to 181 hours -- and this is the real 181. What it says right there in your flight plan, and put LIOH canister, change --

CASPER And then the same for volts, huh?

CAPCOM Affirmative.

CASPER IOH, change.

CAPCOM Roger, 15 into BRAVO, go 12 and ALFA 3.

CASPER Okay.

CAPCOM And if you want to write alleluia or something in there, we're back on the nominal plan, again.

CAPCOM Still in the morning, you notice?

CASPER That's called a champion event.

CAPCOM Roger, we just got in there for the  
rest period.  
CASPER Well, I'm glad you didn't decide to  
scrub that one.  
CAPCOM Man, that's true for right now, Ken.  
CASPER Okay. I'll go back and see if I can  
pick up the Orion and the landing site.  
CAPCOM Okay.  
CASPER Okay, Hank, one of the things we  
didn't talk about was I got 509 running now and I'm going to  
turn it off when I finish this next P24. Does that sound  
right?  
CAPCOM Standby.  
CAPCOM That's a good plan, Ken.  
CAPCOM 10 seconds till T2 -- T1.  
CASPER Okay, thank you.  
CAPCOM Casper, were you going to do the COMM  
check with the LM?  
CASPER Okay.  
CASPER I got another minute or so.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 17:23 CST 173:41 GET CM183/1

CASPER Orion, Casper, Victor Hotel, how do you  
read, over?  
CASPER Orion, this is Casper, over.  
CAPCOM Ken, they should be configuring there, just  
a second.  
CASPER Hello, Orion, you got the combination.  
ORION Good afternoon.  
CASPER Loud and clear, John.  
CASPER Orion, this is Casper, reading you loud and  
clear.  
CASPER Loud and clear, John, how about me?  
CAPCOM Casper, (garble).  
CASPER Loud and clear, John, how me?  
CASPER Okay, you're loud and clear, Charlie.  
CASPER Ah, just fine, smile and we'll take your  
picture here in a minute.  
CAPCOM Casper your DAC should be running.  
CASPER DAC is running.  
CAPCOM And you're coming up on 10 seconds to P2.  
CASPER Okay. Man, that's hard to see in this moonlight.  
Okay, on target.  
CAPCOM (garble).  
CASPER I've got Sun angle at Flag and Spook are  
hard to see until you're right on top of them.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 17:33 GET 173:51 CM184/1

CAPCOM Casper, Houston. We got a bunch of pads to get up to you. The first one I've got for you is your range update, whenever you're ready to copy.

CASPER A range update.

CAPCOM Roger, the ranges that you have, are a little bit in error, and I'd like to give you the correct ones, so that when you compare your range, it would look more better to you.

CASPER Oh, you mean the nominal ranges in the rendezvous profile.

CAPCOM That's affirmative, sir.

CASPER Oh okay, sure.

CASPER Alrighty.

CAPCOM Okay, range at insertion should be 171 nautical miles.

CASPER Okay, that will be 171. Alrighty.

CAPCOM Insertion plus 6 is 142.

CASPER Okay.

CAPCOM OMNI Alpha, Casper.

CASPER You've got it.

CAPCOM Okay, insertion plus 9 is 129. And insertion plus 12 is 120.

CASPER Okay, let's see, that - lets start the same figures that I got in here on it.

CAPCOM They should be about 15 miles different, I understand.

CASPER Okay, what was the last one you gave me. Insertion plus how much.

CAPCOM Plus 12, and it was 120.

CASPER Okay. Okay.

CAPCOM And I have that big bugaboo, the P27 update.

CASPER Okay, I'm ready to copy.

CAPCOM Okay. CSM L - correction, 71 GET 175:43:30. Index 21 starting with 02, 01501 00002 00337 02513 00006 35240 77727 75532 77055 73120 61613 77570 70222 51111 07425 break OMNI Bravo.

CASPER You've got it.

CAPCOM Roger. And starting with 21, 04510 and that's the end of that column. Started on the next one LM 71 -

CASPER Hang on a second, Hank. Standby.

CASPER Okay, Henry. Go ahead.

CAPCOM Okay, starting with LM vector 71, GET 175:55:00. Index 21 data 01501 77775 00270 04377 77662 70436 77660 74724 67755 61614 62362 55364 72047 52342 07431 13320 end of pad.

CASPER Okay.

CASPER Suppose I read it back to you. It's VERB 71 CSM 1754330 2101501, 4 balls 2, 00337 02513, 4 balls 6 35240 77727 75532 77055 73120 61613 77570 70222 51111 07425 04510. LM VERB 175:55:000. 21, 01501 77775 00270 04377 77662 70436 77660 74724 5 - correction 67755, that's line 12 starting at 13. 61614 62362 55364 72047 52342 07431 13320, over.

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 17:33 GET 173:51 CMI84/2

CAPCOM Good read back, Ken.

CASPER Amazing.

CAPCOM And if you'll give us ACCEPT, and bring  
up the HIGH GAIN, we'll get you state vector up.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 1743 GET 17401 CM185/1

CAPCOM Casper, I have a correction to that range  
update I gave you.  
CASPER Okay, stand by just a second. Okay, go  
ahead.  
CAPCOM Roger, the insertion plus 12 should read  
116.  
CASPER Okay, plus 12 is 116.  
CAPCOM Okay, I owe you a consumable status,  
everything's great there, we're nominal, and on our RCS we're  
163 pounds over redline.  
CASPER Okay.  
CAPCOM And the CSM weight, that's forward in the  
CMC is okay.  
CASPER Alright. You want to get me a hack at  
the LM weight or I'll just guess at 59 00 again?  
CAPCOM Stand by, Ken.  
CAPCOM LM weight is 5953.  
CASPER Okay, thank you.  
CAPCOM Casper, you can terminate the Bat B charge  
now.  
CASPER Okay, battery B charge is OFF.  
CAPCOM Casper, the computer's yours.  
CASPER Okay, thank you.  
CAPCOM Casper, I have an ascent PAD for you.  
CASPER Okay, stand by.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 17:53 GET 174:11 CM-186/1

CASPER Okay, you got the numbers?  
CAPCOM We've got the angles, Ken. Torque them.  
CAPCOM Casper, you're clear to torque.  
CASPER Roger. Torque.  
CASPER Okay, Hank, do we have enough time to run  
the -- take a look at this coas star or do you want to get your  
pad, first?  
CAPCOM Roger, Ken. We got about 10 minutes till  
LOS.  
CASPER Okay, Ed. We're in good shape, then,  
cause the star is right here.  
CAPCOM Okay, why don't you press ahead with the  
coas?  
CASPER All righty. I'll be done with it in just  
a jiffy.  
CASPER That's pretty close, isn't it?  
CAPCOM Roger.  
CASPER Okay, I'm ready to copy your pad.  
CAPCOM Okay. Direct ascent burn.  
CASPER Okay.  
CAPCOM Okay, gives a 175 43 3518, NOUN 37 176 37  
5200.  
CAPCOM coelliptics, liftoff 175 46 0937, 911 176  
44 3391, NOUN 37 178 37 all zips.  
CASPER Okay. Direct liftoff 175 43 3518, TPI 176  
37 5200, coelliptic pad, liftoff 175 46 0937, CSI 176 44 3391,  
TVI 178 37 0000, over.  
CAPCOM Good readback, Ken.  
CAPCOM Hey, Casper, you better standby for load.  
John and Charlie are bringing 271 pounds of rocks.  
SC Outstanding.

END OF TAPE

APOLLO 16 MISSION COMMENTARY 4/23/72 CST 1803 GET 17421 CM187/1

CAPCOM Casper, Houston, we're about 3 minutes  
from LOS. Everything looks good here.

CASPER Okay, see you next time around.

CAPCOM Roger.

END OF TAPE